ELECTRICAL REVIEW

4th DECEMBER, 1953

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ELECTRICAL REVIEW 4th DECEMBER, 1953

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872 • VOL. 153 • NO. 23

B.I.F. Electrical Section

IN a letter to *The Times* last week the chairman of the Management Committee of the Birmingham Section of the British Industries Fair said that the Castle Bromwich display had grown from strength to strength since its inauguration 33 years ago. That was true of the Electrical Section, too, until quite recently, but in the last year or two a feeling of dissatisfaction among the exhibitors has resulted in the withdrawal of a number of them, including some of the leading electrical manufacturers.

Several reasons have been adduced for this defection, among them being that overseas buyers do not attend in sufficient numbers; that there are too many other exhibitions—specialized shows which produce better results; that the Fair is held at the wrong time of year; that the Castle Bromwich site is not accessible enough; and that more publicity is given to the London Section than to Birmingham. Possible remedies for some of these alleged shortcomings were put forward at the electrical exhibitors' annual meeting last week: for instance, that the Fair should be biennial instead of annual or that the various trade sections (including the Electrical Section) should be dealt with in a similar way; and that the London and Birmingham Sections should be held in alternate years.

We doubt, however, whether any of these proposals gets to the root of the matter. If a regular annual Fair is unacceptable a biennial arrangement would probably be only half acceptable. The fundamental question is whether the Fair is worth while or not. From its inception the *Electrical Review* has actively backed it, believing that an exporting industry needed such a "shop window." The recent trend of events seems to emphasize the continuing need for something of this sort; no means which can possibly help our export trade must be neglected. Right through the period of the "sellers' market" a substantial number of electrical companies continued to participate in the B.I.F. (in 1948 only about half

of the applicants could be allotted space) and it seems odd that many of them should fall out now when trade conditions are less favourable. It is for the manufacturers to decide, of course, but we would ask them to consider very seriously whether the electrical industry can afford to reduce its representation at the Fair at the present time. We would also impress upon those responsible for the running of the Fair and the preliminary publicity for it the necessity for the constant study of the exhibitors' requirements and of the methods of attracting remunerative visitors from overseas. This will be one of the tasks of the proposed new corporation to which the London Section is to be handed over and on which the Birmingham organization will be represented. The Electrical Exhibitors' Committee has been asked to consider what steps can be taken to induce manufacturers to keep the Electrical Section of the Fair running and will no doubt welcome further suggestions to that end.

THE FAIR'S FUTURE

The foregoing comments deal particularly with the problems of the Electrical Section of the Fair. General consideration of the Fair's future appears in the report of a sub-committee of the Exhibitions Advisory Committee reviewed in this issue. In this the continuance of the Fair as an annual event is regarded as desirable and necessary, maybe with a widened scope. Instead of being a mere sideline of the Board of Trade it should be in the hands of a special public corporation representative of industry. Although the recommendations mainly concern the London Section, the Birmingham Section would be involved to some degree. The Chamber of Commerce would continue to operate it, and would be represented on the new corporation. In the report it is emphasized that there is a need for such propaganda for British industry as the Fair provides in the face of the severe and ever-growing competition in world markets.

ESSENTIALS FIRST

The criticism by the Parliamentary Secretary to the Ministry of Fuel and Power, Mr. L. W. Joynson Hicks, at the dinner of the Electrical Power Engineers Association (reported in this issue) that the electrical industry might do more to provide a greater variety of domestic appliances was most pertinent to the general pattern of electrical development. Consumers' first demands were for means of meeting most conveniently the basic needs of lighting, cooking and heating. When, by the removal of artificial restraints, these demands can be satisfied, the longer daily loading of expensive generating and distribution systems will help to keep the price of electricity at a low level that will encourage a more extensive use of less essential though wholly desirable types of electrical appliances and furnish a further incentive to their design and quantity production.

FUEL AND POWER

A similar appreciation of the value of the domestic load in improving overall load factor was contained in Dr. F. M. H. Taylor's Institute of Fuel paper, recorded in our last issue. This view was supported in the subsequent discussion by the experience of Mr. S. F. Steward, chairman of the South Western Electricity Board, who also raised the relevant query as to whether appliances for the night burning of solid fuel had not been over-sold in advance of the availability of smokeless fuel. Mr. Steward also pointed out the omission from an otherwise well-balanced paper of a reference to the use in electricity generation of the lowest grades of fuel which were likely to be " adequately if not embarrassingly available " in the years ahead.

PLASTICS PROGRESS

New Production Plant at Aycliffe

ALTHOUGH best known for its phenolic and urea thermosetting products (moulding materials, laminated sheet and resins) Bakelite, Ltd., has been active in the thermoplastics field since the early days of the last war. It was in 1943 that the company started making vinyl resin compounds for cable covering at Feniscowles, Lancashire, these compounds being urgently required when the rubber producing countries fell to Japan.

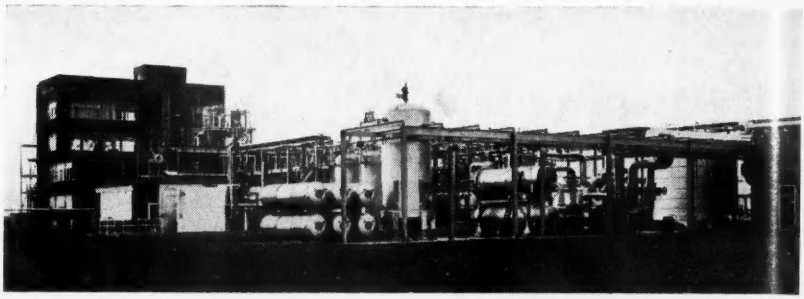
The uses of vinyl resins and their fabricated products have steadily increased in number and the demand has continued to grow in spite of the fact that rubber has again been freely available for years, because vinyl resins have many important properties not possessed by rubber.

At the end of the war the company closed its dispersal factories, returning to the main works at Tyseley, Birmingham, such plant as could be accommodated there. Expansion at Tyseley was limited, and after consultation with the Board of Trade it was decided to develop a site at Aycliffe, Co. Durham, primarily for the production of thermoplastic products of which vinyl type polymers are an important group.

A 35 acre site was selected which included a number of Royal Ordnance Factory buildings. Some were adapted to take the vinyl compounding equipment from Feniscowles, and others used for administration, laboratories, stores, engineering and other services. However, these new facilities were insufficient and a building programme was put in hand. The first phase was completed in 1948 (see *Electrical Review*, 30th July, 1948, page 163). The new buildings house a unit for the manufacture of phenolic moulding materials which is probably the largest and most up-to-date in the world, plant for the production of urea moulding materials and for compounding, calendering and press polishing p.v.c.

The second phase of the building programme was a new resin plant, and this section commenced operation in September of this year. It occupies part of a 47 acre site which the company has purchased immediately adjoining the original 35 acre site. It is a polymer plant, and consists essentially of low temperature storage and mixing tanks for monomers, polymerizing equipment, drying, grinding and screening plant, and weighing and storage facilities to handle the final product.

The plant produces different types of polyvinyl and copolymer resins. Initial production is on the vinyl chloride-acetate copolymer of the " Vinylite VYNW " type, which will be sold under the trade name of " Vybak VYNW." This is a general-purpose resin, giving easier working, fluxing and plasticization than straight p.v.c. resins without sacrifice of mechanical and electrical properties. Present output is at the rate of thousands of tons per annum, and in addition to supplying the company's



General view of the vinyl resin plant showing the outside refrigeration and gas storage equipment

own requirements will be sold to other compounders, and so go some way towards meeting increasing demands of industry for vinyl materials.

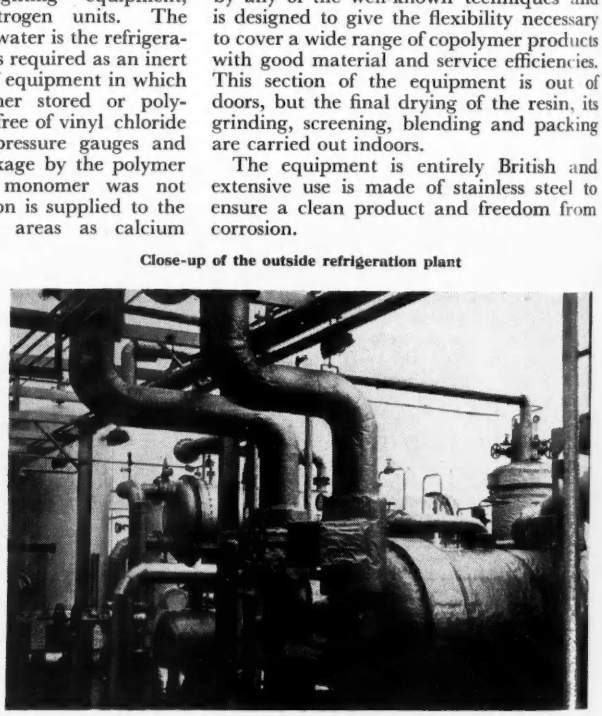
The new plant is well laid out and the services, which are integral with the plant, comprise circulating water equipment and water storage, firefighting equipment, refrigeration and nitrogen units. The largest user of cooling water is the refrigeration plant. Nitrogen is required as an inert blanket in all pieces of equipment in which vinyl chloride is either stored or polymerized, and to keep free of vinyl chloride instruments such as pressure gauges and containers where blockage by the polymer would result if the monomer was not excluded. Refrigeration is supplied to the reaction and storage areas as calcium chloride brine, which is produced by an ammonia compression refrigeration plant.

While normal operation of essential services and operating equipment depends on electric motors, steam driven standby plant, as well as diesel driven generator equipment, automatically takes over in the event of failure of the mains supply.

Raw materials arrive on site in road tankers and are offloaded by pumps or gas pressure into the storage tanks which are grouped together in a tank area. From the storage tanks they are pumped to weigh tanks to make up feed mixtures of varying compositions corresponding to the type of resin being made, and these supply the polymerization system as required. The polymerization system can make resin by any of the well-known techniques and is designed to give the flexibility necessary to cover a wide range of copolymer products with good material and service efficiencies. This section of the equipment is out of doors, but the final drying of the resin, its grinding, screening, blending and packing are carried out indoors.

The equipment is entirely British and extensive use is made of stainless steel to ensure a clean product and freedom from corrosion.

Close-up of the outside refrigeration plant



Manufacture is controlled at all stages by servo-systems, the extensive use of which has enabled the plant to be operated with a small labour force. Control of raw materials and intermediate products is exercised by the technical staff. Special attention is given to ensuring that the finished resin is uniform in all characteristics, and it is tested not only for its physical and chemical properties as a resin, but also by its behaviour when used in a variety of compound formulations specially designed to show up any defects.

The resins are either converted on the site into moulding or extrusion compounds or sheet, or despatched to customers who do their own conversion.

Initial compounding for both moulding and sheet materials follows the same course through ribbon-type pre-blenders, Banbury mixers and two roll mills. For moulding and extrusion compounds, strips are fed into granulators where they are cut into chips of various mesh to suit different applications.

For the production of sheet, the Banbury and milled compounds are fed to calenders which produce material up to 54in wide and up to 0·03in thick. The calendered sheet in roll form is then either supplied to customers for further processing—for example, embossing—or is polished in the company's own presses.

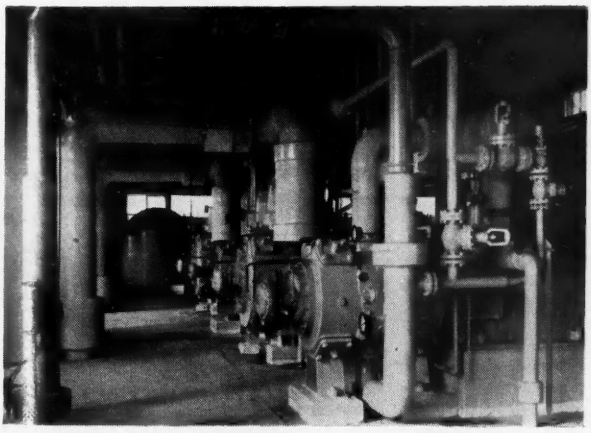
It will be realized, therefore, that the thermoplastics products of the Aycliffe plant fall into four groups—copolymer resins, moulding and extrusion compounds, calendered sheeting and rigid and flexible press polished sheet. They all have excellent chemical resistance and good electrical properties. They vary from completely rigid to soft rubbery textures, and their colour range is virtually unlimited. Rigid grades are characterized by exceptional dimensional stability.

The filled resin bags are sewn and sealed by machine before despatching

The "Vybak" range of extrusion and injection moulding compounds are used, for example, for the coating of electric cables, telephone, radio and car wiring, motor car wing piping, garden hose and belts.

The newest of these materials are those used for the production of flexible injection moulded components which are finding increasing use in various applications in industrial and domestic markets. Rigid extrusions for chemical piping and similar purposes are produced from other compounds and compounds are also supplied for making long-playing gramophone records.

The compressors in the refrigeration plant



Calendered sheeting, which is otherwise used for handbags, wallets, etc., is used as the intermediate form for the manufacture of press polished sheeting. The latter is of particular interest, and the company has been a pioneer in this country in the production of glass-clear sheets, both flexible and rigid, which are being supplied in increasing quantities to the motor trade. The rigid sheets are used as side screens and the flexible ones for rear windows in drop-head coupes.

Within the last year or two there has been an increasing awareness in this country of the importance of polyvinyl chloride rigid sheet as a material of construction for chemical and allied plant. Techniques for the use of this material have been known and used on the Continent for some time. The company now makes a rigid sheet suitable for this work, which is inert to most acids and alkalis and can be fabricated with the use of relatively simple equipment.

In addition to the production plant and testing facilities at Aycliffe there are also research and development laboratories, which work closely with the works technical staff. Fundamental research is, however, carried out at Tyseley.

Public Utilities' Price Policy

AN economist's view of the way in which public utilities should determine prices was given in a recent lecture to the Institute of Public Administration by Mr. G. J. Ponsonby, Reader in Commerce, University of London. Mr. Ponsonby maintained that pricing policy could not be separated from investment policy or from questions of the extent to which the service ought to be provided and in what qualities. Charges could not be fixed until it had been decided whether revenue should cover all costs, including interest; whether the undertaking should be subsidized or self-supporting; and whether it ought to bear any part of the cost of defence, distribution of industry, or the maintenance of employment.

His own view was that utilities should fix prices so as to cover all their real costs but not costs arising from social policy. In determining real costs, the only difficulty arose over interest. He thought that revenue ought to cover rent on any land for which there were other uses and the cost of replacing wasting assets. The burden of obsolete assets which no longer served any function should not fall on its accounts; instead, there might, for instance, be a bondholders' compensation fund, derived from general taxation, in respect of old investments which could no longer "earn their keep."

The services of utilities ought to be available to all, provided only that the prices charged were sufficient to enable costs to be recovered by revenue. This implied that no opportunities should be missed of providing services sufficiently wanted by the public to justify their provision from a financial point of view. It implied minimum cost, maximum efficiency, and prices no more than sufficient to cover the costs incurred. It implied that, whenever monopoly profits were being earned, there were latent opportunities to provide additional services or lower prices.

To ensure that all present and prospective demands were met, the greatest freedom in the matter of pricing was required, both upwards and downwards. Customers wanted quality of service as well as low prices and the aim of a public utility should be to provide, in every market, that combination of money, price and quality of service which was most preferred, i.e., that which evoked the greatest volume of traffic or was the most popular. Any undue standardization of charges would militate against this.

The benefits of the service should be provided impartially, but this did not imply uniform charges; for instance, there could be legitimate differentials between the price of first and third class travel or in favour of bulk supply.

Questioned about the applicability of his views to charges for electricity in rural areas, Mr. Ponsonby replied that the burden of any subsidy needed to provide the service at a reasonable price in remote areas ought to be borne by the general taxpayer and not by the user of electricity in areas where supply cost less.

Electrostatic Precipitators

Experience in South Africa

AN account of experience gained while improving the performance of electrostatic precipitators of three different types at the 206 MW Congella power station, Durban, was given by Mr. N. Troost (South African Electricity Supply Commission) in a paper presented on 25th November before the Institution of Electrical Engineers. Mr. Troost said that alterations increased full load efficiency in one case from 70 to over 90 per cent.

Drift velocity, i.e. the speed at which a dust particle moved under the influence of the electric field in a direction at right angles to the gas stream, was, he stated, an important criterion of performance. Its value, allowing for modifications caused by effects in operation, such as inequalities in the electric field and inaccuracies in electrodes, could be determined by inserting in the formulæ he gave the efficiency measurement and dimensions of the precipitator. Experiments at Congella supported the theory that the electrical charge was proportional to the square of the diameter of the dust particle, if of more than one micron. Dust collected in the first pass of the two-section horizontal-flow apparatus was appreciably coarser than that found in the second, proving the drift velocity of the larger particles to be greater. Intermittent rapping at intervals of half an hour produced, in general, better results than continuous rapping.

A relationship for the field strength in a parallel-plate horizontal-flow precipitator, based on that for a wire-in unit, was evolved and expressions were introduced for calculating theoretical performance with non-uniform gas flow and with dust of mixed composition. There was evidence that pulverized fuel dust was composed of two kinds of particles—one wholly ash and the other coal minus volatiles, i.e. coke. Average drift speeds were higher for the former. Drift velocities for plants using Natal duff coal were calculated for a given field strength and compared with those measured in other countries, the ashes being very similar.

Two instances of improvement were described. In one initial efficiency was only 70 per cent instead of the 93 per cent guaranteed. The vertical-flow precipitators (installed in 1944–1946) were designed for a gas velocity of 4·9ft/sec and the designed minimum drift velocity was calculated to be 0·27ft/sec. On installation the combustible percentages and gradings in the inlet, outlet and caught dusts did not differ appreciably, although with a vertical-flow precipitator the outlet dust should contain more carbon than the inlet. Anemometer tests showed that in about one-third of the precipitator tubes the velocity was 7·4ft/sec and in the remainder 3·7ft/sec. With the design drift velocity of 0·27ft/sec the efficiency should have been 88 per cent. The difference in efficiencies was due to the turbulence caused by the higher gas velocity in one section, which disturbed and re-entrained already deposited dust, thus lowering the effective drift velocity.

In the second case bends in the inlet ducting of two of the horizontal-flow type (installed in 1948–50) gave a whirling motion to the entering gases and concentrated them near the periphery. Electrical instability, shown by flashovers between electrodes, was due to build-up of ionization in dead pockets of gas, the humidity of which was very low. Correction of uneven gas distribution resulted in high operational efficiency in both examples, but this failing was the most difficult to correct.

DISCUSSION

The subsequent discussion was opened by Mr. E. McCabe (B.E.A.) who urged that users of electrostatic precipitators could appropriately play a part in essential fundamental research, since they had everything to gain and nothing to lose as compared with the manufacturers. The B.E.A., the largest user in Europe, and probably in the world, had set up two pilot-scale projects for this research. At least one power station equipped with electrostatic precipitators having centrifugal arrestors was giving a combined collecting efficiency of 98 per cent.

Dr. R. F. Heinrich (Simon-Carves, Ltd.) said that Mr. Troost's results were confirmed by experience in Germany and America and in this country. The difficulty of precipitating coke as compared with mineral particles could be met by means of catch-pockets on the receiving electrodes. Suitable receiving electrodes also helped to keep the plant clean and prevent dust from sticking to the electrodes, thus preventing a fall in efficiency. Several equipments of this kind were giving the same efficiency after more than ten years' use.

Mr. H. J. Lowe (B.E.A. Research Laboratories) thought some of Mr. Troost's simplifying assumptions might be misleading. He deduced, for instance, that the mean value of the field in a wire-in-cylinder was equal to $\frac{2i}{\mu}$. The field was greatly in excess of this approximation, which was justified only at densities considerably higher than those normally experienced.

Mr. H. W. Wagner (Sturtevant Engineering Co., Ltd.) emphasized that experienced manufacturers could be trusted to design a satisfactory plant whether the gas flow was vertical or horizontal. He urged that, particularly when advice was sought on a new problem, they be given full particulars of particle size, dust burden, distribution of carbon, and whether the grits would require intensive rapping on account of extremely adhesive quality. He drew special attention to the importance of keeping precipitators in good order.

Dr. M. Ouyang (E.R.A.) said that past research had been concentrated mainly on the charging and repelling of the particles by the collecting electrodes. He was pleased that attention was being turned to the last stage after the particles had been driven on to these electrodes. Personally, he felt that most of the trouble was due to re-entrainment into the gas flow. The primary reason might be not in the property of the particles so much as in turbulent gas flow. He suggested that "electric precipitation" was preferable to the term "electrostatic precipitation."

Mr. H. G. Trevor Busby (Lodge-Cottrell, Ltd.) said that while the many variables precluded the possibility of treating electric precipitation as an exact science, the paper constituted a real contribution to its practice, particularly as applied to the disintegration of fly ash in modern boilers. One difficulty was that the dust handled was to some extent an unknown factor. Good gas distribution had a decisive influence.

Mr. J. W. Parkington (B.E.A.) said that re-entrainment could be prevented in several ways. Many particles had medium resistivity. Some would be smothered by the arrival of further particles, and some would land on an insulating dust layer. Thus leakage would be slowed down. A dead zone along a smooth plate, baffles, chutes and so on were all means of trapping "creeping" particles.

Mr. J. H. Gosden (B.E.A.) expressed doubt as to the validity of the Deutsch formula, since it ignored the behaviour of the particle when it reached the electrode. It was also assumed that, except where adjacent to the collector plates, the motion of the particles was determined entirely by turbulence of the gas stream. Its effect on the larger particles was, however, negligible.

Mr. G. R. Peterson (B.E.A.) stressed the importance of the increase from four million or so tons of pulverized fuel fired in power stations before the war to twelve million tons last year. This figure was expected to double in four or five years' time, since electrostatic precipitators were mainly used with pulverized-fuel boilers.

Mr. D. H. Lucas drew attention to the importance of adhesion of particles to the surface and to one another. With larger and larger particles there would be a point at which the electric force would predominate. The force tending to remove a carbon particle was proportional to the field strength. Carbon particles progressing along a plate electrode might settle and remain on a point of minimum field. On a tubular electrode they were always subjected to the same field, which tended to remove them.

Mr. C. V. Stairmand (I.C.I., Billingham) observed that drift velocity was higher for carbon and conductive particles owing to the difference between the drift velocity and the degree of re-entrainment. Could Mr. Troost devise an experiment to determine separately drift velocity and loss of efficiency due to re-entrainment?

Mr. D. O. Heinrich (Simon-Carves, Ltd.) drew attention to the part played by the skilled designer in producing electrodes which would reduce re-entrainment to a minimum and would allow the carbon particles to precipitate.

Marine Gas Turbines

Fuel Systems, Design and Performance

TWO papers on marine gas turbines were presented at a meeting of the Institution of Mechanical Engineers in London on 27th November. One by Mr. R. F. Darling (Pametrada) dealt with fuel systems and controls and the other paper by Mr. B. E. G. Forsling (British Thomson-Houston Co., Ltd.) described design features and performance in test of the main propulsion set for the oil tanker *Auris*.

In the first, the author, emphasizing that reliability during a long life was by far the most important requirement for control of marine power plants, described the 3,500 h.p. Pametrada unit with a heat exchanger. This consisted of two axial flow compressors in series directly coupled to a high pressure turbine and an independent low pressure turbine transmitting power through a hydraulic coupling and double-reduction gear box. A single primary combustion chamber and parallel combustion chambers for reheating between the two turbines were other features; without reheat 60 per cent of power was obtainable. Inlet temperature to each turbine was 1,200 deg F.

Design Trends

After giving particulars of the sprayers, control blocks, fuel system, transmission, reversing mechanism and governors, with reasons for their choice, Mr. Darling discussed future trends. The high temperatures and compression ratios adopted for fuel economy would, he said, make the gas turbine smaller and lighter than any competitor. The outstanding problems of fouling and corrosion by fuel-oil ash would be overcome and the double compound engine with free intermediate pressure power turbine would be usual for marine work. With blade cooling, gas at 1,500 deg F could be employed, leading to compression ratios of over twelve to one. Intercooling between compressors and the use of heat exchangers and multiple parallel combustion chambers would be general, but reheat would be unusual. Power output would be controlled by the fuel lever alone.

Oil Tanker Propulsion Set

In the second paper Mr. Forsling also emphasized the importance of reliability and length of life, which called for high component efficiencies, necessitating the use of a multi-stage uncooled turbine and a maximum operating gas temperature of 1,200 deg F. The set, which with its components (including a heat exchanger) was described in detail, comprised one compressor and two turbines in series, the high pressure unit driving the compressor and the low pressure unit driving the alternator which supplied power to the propeller motor.

Space limitations prevented the achievement of high thermal efficiency, which was 20 per cent overall at the designed inlet gas temperature of 1,160 deg F and the rated alternator output of 860 kW with fuel of 18,000 B.Th.U./lb. The test run of 680 hours included a period of 363 hours on heavy (residual) fuel oil with a viscosity of 1,500 sec Redwood No. 1, 270 hours being continuous. The oil was burned as received and preheated to from 212 to 221 deg F. The high pressure turbine suffered somewhat from ash deposition, indicated by gradually rising pressure and temperature at the high pressure turbine inlet and by a slight drop in overall thermal efficiency at maintained speed.

When the set was restarted after the 270 hour run the compression ratio and inlet-gas temperature were nearly the same as at the beginning of the test on heavy oil, indicating that most of the deposit in the high-pressure turbine blading had broken off after the shut-down, probably due to differential heat expansion between the deposit and the blades. Drop in turbine efficiency was compensated for by increased pressure ratio and inlet temperature, which increased the energy available in the low pressure turbine, so the net output increased at maintained speed. No falling off in compressor efficiency was observed. No intake filter was provided.

Coronation Broadcasts

Arrangements Described in I.E.E. Paper

An account of the technical arrangements for the sound and television broadcasts of the Coronation of Queen Elizabeth II on 2nd June was given in an I.E.E. Radio Section paper which was presented at an ordinary meeting of the Institution yesterday (Thursday) by Messrs. W. S. Procter (G.P.O.) and M. J. L. Pulling and F. Williams (B.B.C.).

Both sound and television programmes were broadcast simultaneously to the United Kingdom and much of Europe, temporary equipment being installed at foreign centres to convert the 405 line signal to 441, 625 and 819 lines used on the Continent. The magnitude of the operations was illustrated by comparison with those at the Coronation of King George VI in 1937. This time there were 95 sound commentary positions (including 84 for overseas) against 17 (10 for overseas) and 48 B.B.C. overseas transmitters instead of six. For television 21 cameras were used, five being in Westminster Abbey, with transmission from eight stations here and 12 on the Continent, the audiences being estimated at 20 million and $1\frac{1}{2}$ million respectively in addition to millions of extra-European viewers.

The two kinds of broadcast, though largely planned and executed separately, were in some respects complementary. Television relied on the sound service for sound pick up within and immediately outside the Abbey, while commentators at some points received guidance from television screens. The Post Office installed 1,400 telephone circuits between commentary points and broadcasting centres. Several novel features were brought to fruition in time to be included in the programme.

Twenty-eight microphones were installed in the Abbey; those for orchestra and choir were of the new B.B.C. ribbon design, the rest being of the moving coil type, many of which were surrounded by objects which altered their frequency response so that electrical correction was necessary. All commentators used the lip microphone developed by the B.B.C. Research Department in 1937, which prevented mutual overhearing when commentators stood not less than 4ft apart. At the Colonial Office site one line of 27 commentators were able to talk simultaneously. This lip microphone consisted of a miniature ribbon microphone which was insensitive to sounds arriving from the sides and greatly exaggerated low frequencies for close-up speech. Recording the broadcasts often called for the simultaneous use of 58 channels—47 disc and 11 magnetic tape.

Eighteen of the 21 television cameras were equipped with a new type of variable equalizer, primarily to compensate for the loss of resolution caused by deficiencies in the optical and electro-optical elements of the cameras. Vision switching without loss of frame synchronization was achieved by phase locking of the frequencies of the frame waveforms from all cameras and sources—a feature not previously used in this country. Seven sets of telerecording equipment were in use with standard 35 mm or 16 mm films in this country, Canada and the U.S.A.

Numerous circuit diagrams illustrated details of the various technical devices described in the paper. The new Post Office ducts and cables in London were arranged for subsequent incorporation into the junction cable network providing for the normal growth of circuits.

Fluorescent Dimming Circuits

In a paper presented at a recent meeting of the Illuminating Engineering Society Dr. H. H. Ballin and Mr. W. J. Vine traced the progress of fluorescent dimming circuits since their introduction in 1950. New and simplified circuits for use where the full range of adjustment was unnecessary were demonstrated, including 5 and 20 stop miniature types. Colour changing circuits for shop window, industrial and theatrical lighting and for indoor and outdoor floodlighting were described. The need for care in the selection of suitable colours and for avoiding a predominance of any strong colour, such as green, was mentioned.

NEW BOOKS

The Current Rating of Single Core Paper Insulated Power Cables. By C. C. Barnes, A.M.I.E.E., A.I.I.A. Pp. 99; figs. 15. Association of Engineering and Shipbuilding Draughtsmen, Onslow Hall, Little Green, Richmond, Surrey. Price 6s.

This little book is supplementary to a previous A.E.S.D. publication entitled "Current Rating of Paper Insulated Power Cables." It elaborates the special case of single-core cables, which are finding increasing scope in view of the trend towards higher transmission voltages and heavier currents. In regard to the latter even for short runs (e.g., from transformers to switchgear) single-core cables are usually preferable to three-core cables on the score of weight and bulk and simpler terminal arrangements. A great deal of fundamental information has been compressed into a small amount of space and the limiting conditions and correction factors in relation to such matters as sheath and dielectric losses, and various methods of laying—directly in soil and in ducts and in air and water—are clearly worked out.

For a comprehensive work on the design, manufacture and installation of power cables, the reader is referred to the author's larger work on power cables, which was reviewed in the *Electrical Review* of 14th August last.—C.O.B.

Circuit Breaking. Edited by H. Trencham. Pp. 206; figs. Butterworths Scientific Publications, 88, Kingsway, London, W.C.2. Price 30s.

This book is based on a course of six lectures describing the researches of the E.R.A. on circuit breaking, and given originally in 1952 at Regent Street Polytechnic and at Armstrong College, Newcastle-on-Tyne. The text has been edited by Mr. H. Trencham who also contributed one of the lectures—"The Impact of E.R.A. Research on Circuit Breaking Practice." The remaining lectures are by members of the E.R.A. staff and deal with the following topics:—"Aims, Achievements and Problems of the E.R.A.'s Work" (Dr. W. B. Whitney); "Theory of Circuit Interruption" (A. M. Cassie); "Circuit Constants" (L. Gosland); "Electrical Discharges" (Dr. C. E. R. Bruce); and "Methods and Techniques in Circuit Breaker Research" (F. O. Mason).

The lecture style has been largely retained and on the whole this treatment is successful although some colloquialisms have been left which would have been better deleted.

The book makes available in convenient form much authoritative information which should be of value to designers, system operators, and consultants. It also provides a very interesting account of the historical development of circuit breaking technique from 1920 when the E.R.A. began to work on the subject, and puts on record the part played by the E.R.A. in pioneering the air-blast switch. No mention is made of recent large-scale developments, such as the switchgear for the British 275 kV system, the Swedish 380 kV system, or the American Gas and Electric 330 kV system. However, these developments do not involve any really new principles and are probably regarded as outside the scope of the book.—J.S.F.

Books Received

Principles of Electricity in M.K.S. Units. By A. Morley, O.B.E., D.Sc., Hon. M.I.Mech.E. and E. Hughes, D.Sc. (Eng.), Ph.D., M.I.E.E. Pp. 364; figs. 227; index. Longmans, Green & Co., Ltd., 6 & 7, Clifford Street, London, W.1. Price 10s 6d.

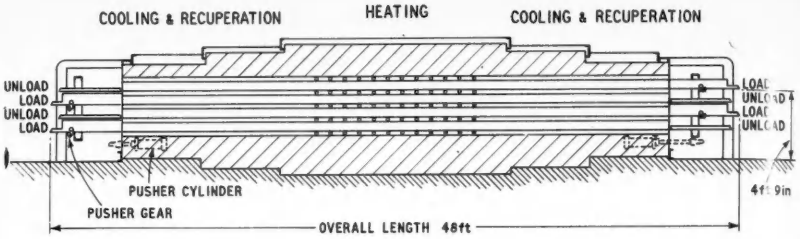
Fundamentals of Electron Motion. By Willis W. Harman. Pp. 319; figs. and index. McGraw-Hill Publishing Co., Ltd., 95, Farringdon Street, London, E.C.4. Price 46s 6d in the United Kingdom.

Magnetic Amplifiers. By G. M. Ettinger. Pp. 88; figs. 48; index. Methuen & Co., Ltd., 36, Essex Street, London, W.C.2. Price 6s 6d.

Circuit Theory of Electron Devices. By E. Milton Boone. Pp. 483; figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 68s in the United Kingdom.

The Magnetic Amplifier. By J. H. Reyner, A.C.G.I., B.Sc., D.I.C., M.I.E.E., M.Inst.R.E. Pp. 119; figs. 72; index. Rockliff Publishing Corporation, Ltd., 1, Dorset Buildings, Salisbury Square, London, E.C.4. Price 15s.

Electrical Breakdown of Gases. By J. M. Meek and J. D. Craggs. Pp. 507; figs. and index. Oxford University Press, Amen House, Warwick Square, London, E.C.4. Price 60s.



Pottery Firing

Multi-Passage Kiln at Stoke

THE past forty years have seen a vast change in the glazed tile and pottery works of Biltons (1912), Ltd., Stoke-on-Trent. When Mr. J. Tellwright acquired and founded the present business, in 1912, he based it on a small existing pottery which made red teapots. About 20 men were employed on premises occupying a site of about half an acre and for firing the ware there were two intermittent bottle ovens, only one of which was in use. To-day the factory covers three acres and employs 360 operatives, two-thirds being women who are engaged principally in the production of glazed tiles and domestic teaware.

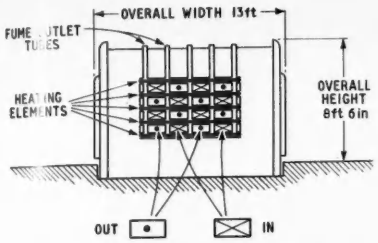
To speed up output and to facilitate the employment of semi-skilled labour the company pursues a steady policy of mechanization. In the making shop, in addition to ten hand-operated machines, there are now four cup and four flat semi-automatic machines. These are all by William Boulton, except for one Gosling and Gatensbury cup machine. Three Strasser machines are used for cup handling and deal with fourteen cups per minute each. A Biddulph cup-dryer is used which provides flow production from handling to boxing and looking over to where the products enter the biscuit ovens. In the earthenware dipping house a Hopol dryer is used. The casting plant has also been completely modernized and now includes Biddulph dust removal equipment.

In the tile works almost complete mechanization has been achieved, the body being untouched by hand from the time the clay goes into the blunger until the woman operative has made the tile. The dust is dried in three steam-heated drums, which dry 30 tons of body per week. The tile making machinery consists of two Collington and Owen fully automatics, eleven semi-automatics and five fly presses. After biscuit firing the tiles are glazed under a Gosling and Gatensbury dipping machine.

At the end of the first world war production of white ware was started and a Dressler tunnel oven was installed. It was heated with producer gas and fired both biscuit and glost; this oven was followed by two Bailey-type intermittent enamel kilns. A second producer-gas-fired tunnel oven was installed in 1929, by Marlow, this being built on what is now the tile works. Biscuit, glost and clay-dipped earthenware were fired in the oven.

In 1934, the company started making glazed tiles and this led to the installation in 1936 of a Davis Revergen tunnel oven for firing glost tiles. Embodying the principle of reversible generators for pre-heating the primary air, the oven is still in use to-day and takes the output of the tile works which is about 2,500 yards of tiles and 600 dozen pieces of faience a week. Biscuit tiles are fired in the Marlow tunnel oven.

During the last war the works was closed but afterwards extensive reconstruction and modernization of the earthenware section were carried out. The Dressler oven



The Birlec 16-passage tunnel kiln for biscuit and glost firing installed by Biltons (1912), Ltd. Sectional elevation (left); cross section (above)

was demolished and all biscuit earthenware was fired with the tile biscuit in the Marlow. In 1946 an electrically heated Birlec 18in moving belt furnace was purchased to fire glost earthenware. The continued expansion of the business resulted in an electrically heated Moore tunnel kiln being erected in 1949 to fire glazed earthenware when the Birlec furnace was switched over to enamel firing. This Birlec oven has preheating, firing and cooling chambers arranged to form a continuous tunnel through which the 18in wire mesh belt conveyor passes.

In 1950 a Gibbons Gottigne multi-passage oven was installed to deal with teaware biscuit. This has 24 passages arranged so that twelve of these are loaded from each end of the furnace. Working 24 hours a day it is capable of firing 12,000 dozen of biscuit teaware a week.

With the original intention of glost firing the output of the Gibbons oven a Birlec Heurtey multi-passage furnace of similar construction has recently been installed, but since putting this into service, it has been used to fire both biscuit and glost at the same time. It has 16 passages each 15in wide and 8in high, arranged in banks of four. The top two rows of passages are used for biscuit while the bottom two are loaded with glost. Loading is carried out at both ends, an arrangement which makes for economy in operation as it enables work which has passed through the heating chamber to pre-heat in passing the unfired ware which is moving into the furnace.

The furnace is 48ft long and the ware is loaded on batts which slide on special refractories extending through each passage. Hydraulic pusher gear at each end of the oven propels these progressively through the furnace at predetermined intervals. When first installed a cycle of 24 pushes per day was employed but this has now been stepped up to 31. It is proposed to increase this to 40 pushes per day. The power consumption at present is 62 kW; the furnace is still being "run-in." The only labour required is two men at each shift, one at each end of the furnace to load and unload as and when required. The output of 31 pushes per day is 4,500 dozen of biscuit and 4,500 dozen of glost ware per week.

The furnace has a temperature range of up to 1,200 deg C and is designed to operate from a 415 V three-phase 50 c/s supply which is fed to spiral-wound elements retained in suitable horizontal holes in the brickwork forming the floor of the tunnels. These are connected to external busbars mounted on the sides of the oven casing, the arrangement being such that individual elements can be speedily replaced without stopping the work. The tunnels are lined

General view of the multi-passage furnace

with special high quality refractories backed by high grade insulating bricks.

Two recuperative or preheating sections (symmetrically situated at either end of the firing zone) are provided. In these the preheating and cooling of the ware is effected by thermal exchange between the entering and leaving charges contained in the adjacent passages. To ensure as complete a heat exchange as possible, the vertical walls separating the passages are of open-work construction in the recuperative sections. The design is such that there is adequate allowance for expansion to ensure that there is no undue distortion throughout the length of the tunnels.

Batts of biscuit and glost entering the multi-passage furnace

The furnace is 13ft 6in wide and 9ft 6in high. It is constructed of heavy gauge steel plates, reinforced with structural members. To provide access for loading the topmost tunnels the furnace is sunk slightly below floor level. Placing and drawing of the batts holding the ware is carried out on the platforms of the pusher structures situated one at either end of the oven. One operator at each end places one loaded batt in eight alternate passages and removes one finished batt from each end of the other eight tunnels. The pusher mechanism is actuated by a single-acting hydraulic cylinder on the forward stroke, the return stroke being effected by balance weights. The actual pusher bars are so arranged that at the end of each stroke they move clear of the batts to facilitate charging.

The end batt is moved forwards by the pusher gear and pushes all the other batts in front of it in a sliding movement over the special refractories which form the floor of the passages or tunnels. In each vertical row and each horizontal row of tunnels, the direction of movement of the batts is always opposite to those in the adjoining tunnels either vertically or horizontally. The pushing cycle is initiated by a push-button which starts a hydraulic pump motor. At the end of the forward stroke an indication is given to the operator by a red light that movement has ceased. The pusher mechanism returns to its original position through manual operation of a valve which releases the oil pressure in the cylinder and allows the pusher frame to return under the influence of the balance weights.

Means are provided for removing the excess volatiles from the products in each individual tunnel. Evacuation is through vertical flues under natural draught conditions. Provision is also made for collecting dust caused by abrasion between the batts and the floors of the tunnels to prevent spoilage of the ware.

The firing chamber is arranged in four zones, divided vertically, each being controlled by a Cambridge N.I.P. automatic temperature regulator, suitably calibrated. A four-point recorder is also included to give a permanent record of the temperature in each zone. This is provided with additional contacts which are set a few degrees above the control temperature setting and arranged to switch off the oven in event of the temperature exceeding a safe value.

Trolley-buses for Manchester

Manchester Corporation Transport Committee proposes to buy sixty-two trolley-buses, which it estimates can be run a penny a mile cheaper than motor-buses in view of the present fuel tax.

VIEWS on the NEWS

By REFLECTOR

SOME time ago I mentioned complaints by grocers about the colour-rendering properties of fluorescent lamps as they affected the appearance of food displays. A series of tests, adjudged by representatives of the classes of shopkeepers concerned (food and non-food), has recently been made at the London Lighting Service Bureau. A number of combinations of fluorescent lamps of various colours, mercury vapour tubes and filament lamps were arranged, apparently to the satisfaction of the "juries." I have had a list of the results and particularly note that "the choice of colour for meat and bacon is influenced by the preference for lean meat in the South and fat in the North of England," which suggests that Jack Sprat and his wife have separated.

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It is often stated that motor car batteries are being far too heavily loaded now that so many electrical "gadgets" are being built into the vehicles. However, a device, the use of which seems justifiable, is an immersion heater for heating liquid in vacuum flasks which was demonstrated last Friday on the B.B.C. television programme "Inventors' Club" by Mr. H. Hopper, an electrical engineer of Bridlington, Yorkshire. The stainless steel cased rod type element is surmounted by a conical bung to fit into various sizes of flask and it is grooved to relieve any pressure that may build up. With a 12 V element a load of 10 A is imposed on the battery, which is no more than that of an average set of headlamps.

* * *

I have made occasional references to the resentment of Scotsmen to the alleged "export" of Scottish electric power to England. The recent attempts to destroy grid towers near the Scottish border seem to be related to this imagined grievance. I say "imagined" because it is untrue that England is benefiting from Scottish power at Scotland's expense. Mr. Thomas Johnston, chairman of the North of Scotland Hydro-Electric Board, says that it "has been disproved time and time again to the point of weariness." In the 45 months to September last there was a net import of electricity from England in 38 months and only seven in which the balance was the other way and then only on a small scale.

* * *

Secrecy and "security" seem to loom ever larger in our daily lives. Men who used to be known as "watchmen" are now "security officers" and secrecy is often carried to ridiculous lengths. Indignation was expressed at a recent meeting of the Lossiemouth Town Council about a leakage of information from the Lighting Committee's proceedings; it was described as "very reprehensible." And what was it all about? Whether a single street lamp should be sited "at a point equidistant from Queen Street and Commerce Street" or 30ft north of that point.

* * *

Here is the latest addition to my collection of newspaper headlines; it is from the *Birmingham Mail*:—"Power Gear Tax Unfair." It relates to a protest by the Midlands Electricity Consultative Council against the continued discrimination in the matter of purchase tax between electrical appliances and corresponding gas and oil equipment.

* * *

I print, without comment, a paragraph from the *Cambrian News* reporting an address by Mr. D. G. Gwyn of the South Wales Electricity Board:—

> "Farmers who think they can get free installation of electricity if they allow transmission wires to run over their land, are thinking along the wrong lines."

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Minister of Fuel and Power has appointed **Mr. A. N. East,** C.B.E., M.I.E.E., M.I.Mech.E., Assoc.I.C.E., of Abbots Langley, Herts, and **Mr. W. Gilbert,** M.I.E.E., of Ipswich, to membership of the Eastern Electricity Consultative Council.

Mr. F. Edmondson, M.Sc., M.I.E.E., M.I.Mech.E., A.M.I.C.E., of Birmingham, has been appointed a member of the Midlands Electricity Consultative Council.

Alderman T. Evans, J.P., of Pengam, Mon., has been reappointed as a part-time member of the South Wales Electricity Board, and **Colonel J. G. Crabbe,** O.B.E., M.C., J.P., of Duncow, Dumfries, as a part-time member of the South West Scotland Electricity Board.

Mr. J. A. Oldfield has been appointed export market supervisor of the Midland Electric Manufacturing Co., Ltd., and will in future operate from the head office and works at Tyseley, Birmingham. Mr. Oldfield has been with the company since 1946 and until his new appointment was the company's resident representative in New Zealand.

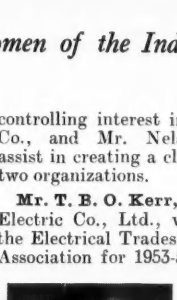
Mr. E. F. M. Butler has been appointed a director of the Barbados Electric Supply Corporation, Ltd.

Mr. Stuart M. Finlayson, president of the Canadian Marconi Co., following a recent meeting of the board of directors, announced that **Mr. H. G. Nelson,** M.A. (Cantab.), M.I.C.E., M.I.E.E., M.I.Mech.E., had been asked to join the board of the Canadian Marconi Co. Mr. Nelson is deputy managing director of the English Electric Co., Ltd., and a director of Marconi's Wireless Telegraph Co., Ltd., the English Electric Valve Co., Ltd., and a number of other companies. He was for seven years managing director of D. Napier & Son, Ltd. For two years he was outside lecturer at the Cambridge University Mechanical Science Tripos course on Industrial Management.

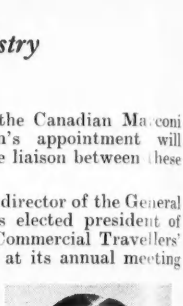
Mr. H. G. Nelson

The English Electric Co. recently acquired controlling interest in the Canadian Marconi Co., and Mr. Nelson's appointment will assist in creating a close liaison between these two organizations.

Mr. T. B. O. Kerr, a director of the General Electric Co., Ltd., was elected president of the Electrical Trades' Commercial Travellers' Association for 1953-54 at its annual meeting held on 20th November, and **Mr. J. Shuter,** G.E.C. sales representative, was elected chairman. The Association has allocated 250 guineas to the Electrical Industries Benevolent Association, 50 guineas to the Royal Commercial Travellers' Schools, five guineas to the I.E.E. Benevolent Fund and two guineas to the Commercial Travellers' Association.



Mr. T. B. O. Kerr



Mr. J. Shuter

Mr. W. Percy McGeoch has been re-elected chairman of the B.I.F. (Birmingham) Electrical Exhibitors' Committee. **Mr. H. Lusty** (Bakelite, Ltd.) is the new vice-chairman.

At a recent meeting of the Council of the Gauge and Tool Makers' Association the following officers were unanimously re-elected for the 1953-54 session :—President, **Mr. F. W. Halliwell,** M.I.Mech.E., M.I.Prod.E.; chairman, **Mr. A. L. Dennison,** M.I.Prod.E.; vice-chairmen, **Messrs. S. J. Harley,** B.Sc., M.I.Mech.E., M.I.Prod.E., and **Mr. L. E. Van Moppes**; hon. treasurer, **Mr. Kirchner,** M.I.Mech.E., M.I.Prod.E.

To mark his recent retirement after thirty-three years' service with the Walsall Corporation Supply Department and the Midlands Electricity Board, **Mr. Philip S. Brett** was presented last Friday with a gold watch by

his colleagues in the Walsall District of the Board in which he held the position of second assistant manager. Mr. J. H. Greenwood, the district manager, made the presentation.

Mr. H. Finch

Mr. H. Finch, until recently the northern manager of J. H. Tucker & Co., Ltd., has been appointed as sales development manager of Volex Electrical Products, Ltd.

The annual "get-together" cocktail party given by **Ranton & Co., Ltd.,** was held in Knightsbridge last week, when a large gathering of customers and other trade friends were welcomed by Col. P. M. Brooke-Hitching, chairman of the company.

Mr. H. W. Bosworth, A.M.I.E.E., chairman of Lancashire Dynamo Holdings, Ltd., was to leave this country on the *Pretoria Castle* yesterday to make a short business visit to South Africa. He was being accompanied by Mrs. Bosworth and they will return from Durban on 19th February. During his stay Mr. Bosworth's address will be at the offices of Lancashire Dynamo South Africa (Pty.), Ltd., 702/11 Lewis & Marks Building, 65, President Street, Johannesburg.

At the annual general meeting of the Junior Institution of Engineers held on 27th November, **Mr. S. G. Clark** was elected chairman and **Messrs. A. S. Ladley,** M.Inst.Met., and **J. H. Sharpe,** were elected vice-chairmen.

Mr. P. Sparrow, M.A.S.E.E., and **Mr. E. C. Collins,** of the City Display Organization, have been appointed to the board of the C. D. Electric Co., Ltd. Both are well-known figures in the exhibition industry, with which they have been connected for very many years. For the past seven years Mr. Sparrow has been manager of the C. D. Electric Co., and Mr. Collins works manager of C. D. Productions, Ltd., which positions they continue to hold.

Mr. E. C. Collins

Mr. P. Sparrow

On 25th November the chairman and directors of the General Electric Co., Ltd., entertained **Dr. C. C. Garrard** to a farewell lunch at the Savoy Hotel, London, following his retirement from the board. A silver rose bowl was presented to him by Sir Harry Railing, chairman and joint managing director. Dr. Garrard's services are being retained in a consultative capacity.

Mr. A. A. Parrott has been appointed secretary of Vent-Axia, Ltd., in succession to **Mr. H. M. Caldwell.**

Mr. H. E. Reigate has been appointed a director of the London Electric Firm, Ltd. Mr. Reigate, who has been with the firm for over twenty years, has been secretary since it became a limited company. **Mr. E. V. M. Hughes** has been appointed managing director.

Mr. S. G. Nimrod has been appointed to the board of the Backer Electric Co., Ltd. He has been connected with the company since its inception and has been works manager for a number of years.

Mr. S. G. Nimrod

At the first annual dinner at Newcastle-on-Tyne of the **North East Electrical Club,** Sir Vincent de Ferranti referred to the large part played by the North East area in the development of the electrical industry. He expressed the opinion that it would not be long before atomic energy removed the need for obtaining coal on the present scale.

Mr. J. A. E. Trinder has joined Siemens Electric Lamps & Supplies, Ltd., as home sales manager. The appointment dates from 1st December, and Mr. Trinder will be based at the London office.

There was little excuse for carrying power lines across the country on pylons, Mr. H. J. Manzoni, Birmingham city engineer and surveyor, said on Friday last. A certain amount of efficiency had to be sacrificed at times to make sure that they did not go too far in what was æsthetically bad manners, he added. Mr. Manzoni was proposing the toast of the **Electrical Contractors' Association** at the annual dinner of the Birmingham branch. Electricity was the most important factor in defeating atmospheric pollution, he said. Another step forward in extending the span of human life could be

Sir George Briggs making the presentation to the Mayor of Oldbury to mark his long association with the Simplex Electric Co.'s Sports and Social Club

made by cleaning the air, and that could be done more quickly and more efficiently by the spread of the use of electricity. Responding to the toast, Mr. M. R. H. Sadler, vice president of the association, said the electrical industry had to continue working hard. To put in for salary and wage increases as a matter of course was not practicable.

Mr. J. J. Gracie, a director of the General Electric Co., Ltd., said he thought it rather strange for the Government, champion as it was of individual freedom, to start an investigation into the "machinations" of the electrical industry in order to protect the nationalized industry from private enterprise.

Mr. Ernest Stroud, technical director of the Brighton Lighting & Electrical Engineering Co., Ltd., is resigning his position with the company, and asks that personal communications shall be addressed to 42, Croft Avenue, Southwick, Sussex.

Mr. W. McGill has resigned his associate directorship of the Power Securities Corporation, Ltd., and his directorship of Balfour Beatty & Co., Ltd., because of ill-health.

The Foremen's Section of the Staff Association of the **Telegraph Construction & Maintenance Co., Ltd.,** and **Submarine Cables, Ltd.,** held its sixth annual dinner at Pyne's Restaurant, Lewisham, last Friday. Mr. C. Douglas, foreman of the Metals Division's welding shop, took the chair and among those present were Messrs. J. N. Dean (managing director), B. H. Musgrave, W. F. Randall, J. Innes, C.B. (director of Telcon) and R. C. W. Reeves (director of Johnson & Phillips, Ltd.). A bazaar held by the Staff Association of the two companies on Saturday at the Telcon sports ground raised over £125 for the Queen Mary's (Roehampton) Hospital.

On Saturday Sir George Briggs presented the **Simplex Electric Co.'s** long-service awards and Social Club prizes at Oldbury. The guest of honour was the Mayor of Oldbury, Councillor F. W. Thompson, who is also a member of the Simplex staff with twenty-six years' service and already holds the company's long-service gold watch. His lengthy association with the Sports and Social Club was marked by the gift of a pen set and wallet.

OBITUARY

Dr. T. Settle.—The death occurred on 5th November, at the age of eighty-three, of Mr. Theodore Settle, Ph.D., M.I.E.E., who for many years was associated with the General Electric Co., Ltd., which he joined in 1909 as manager of the Arc Lamp and Carbon Department. In 1920 he was appointed in addition manager of the Heating Department, being responsible for the business in domestic cookers, radiators and small household appliances as well as industrial cooking and baking. On the formation, in 1921, of the United Lamp Black Works, Ltd., Dr. Settle was appointed a director and acted as chairman and sales manager. He retired from the G.E.C. in March, 1947.

Before joining the G.E.C. Dr. Settle had worked in the post-graduate laboratory at Leipzig University under Professor W. Ostwald (1895); with Professor Moisson in Paris, on the use of electric furnaces and production of synthetic diamonds (1896-1898); and with Brown Boveri & Co., Switzerland, where he developed factories for the manufacture of carbide of calcium (1898-1903). He later went into business on his own account and was joint managing director of the London Electron Works, Ltd. A memorial service was held on 13th November at the Church of St. Anselm and St. Cecilia, London.

Mr. E. Broadfoot, of the British Thomson-Houston Co., Ltd., who was well-known in the Scottish electrical industry, died in Glasgow on 10th November, at the age of fifty-four. Since joining the B.T.H. Glasgow office in 1939, Mr. Broadfoot had dealt mainly with street lighting installations and was associated with a number of important schemes.

Mr. K. H. R. Lauben, a director of E.M.I. Sales & Service, Ltd., in charge of distribution, died on 25th November at the age of fifty-two. He had been associated with companies of the E.M.I. group for thirty-eight years.

Industry and the House

Debate on Commercial Television

By A. M. F. PALMER, A.M.I.E.E., M.P.

THERE has been something of a lull in the House of Commons. This seems always to occur in the period after the debate on the Address and before the arrival of the Bills that are promised in the Queen's Speech. It is not surprising then that public attention should have switched away from the faithful Commons to their Lordships in the other place conducting a mighty argument on commercial television.

As I was able to snatch an occasional hour or so to go to the bar of the Lords and hear the debate, and also since the arguments deployed last Wednesday and Thursday will be made again with redoubled force soon in the Commons, I think it may be useful to mention some of the points.

Government Proposals Opposed

The importance of the occasion was evident. In the eight years of my connection with the House of Commons I do not ever remember seeing before quite so many noble legislators present together at one time on the red benches. Lord Hailsham, once widely known as Mr. Quintin Hogg, M.P., opened the attack on the Government's proposal to allow the establishment of privately controlled television stations financed from advertising revenue. His motion recognized "the desirability of an alternative television programme," and in his speech he argued that this was feasible within the existing B.B.C. system. He made, it must be conceded, a telling point when he said that hitherto broadcasting had been out of the range of controversial party politics. From the beginning of the establishment of the B.B.C. Tories, Liberals and Socialists had accepted the principle that broadcasting should be a public service. It was, therefore, no good blaming the Labour Opposition for introducing party into the matter; the Government had been the first to do it.

Coming from a Conservative the foregoing was, of course, strong stuff; there was much more in the same strain which has been well reported in the more serious part of the general Press. Lord Hailsham's more technical points, however, were that while genuine sponsored television might pay for a short time, commercial television of the type now favoured by the Government had never been successfully tried in any country. Some £500,000 of public money was to be invested to enable advertisers to make a profit; this was a curious example of classical finance. He thought the only form of practical competition which would be provided would be for the artists who would be enabled to demand more pay for their performances. The immediate effect on the B.B.C. would be to compel them to put up the price of a licence for their own parallel service and the ultimate consumer would pay all round.

Former B.B.C. Chairman's View

I have space only to summarize the arguments of two other important opponents of the Government's plans, Lord Simon of Wythenshawe and Lord Waverley, before I turn to those who back the Government. Lord Simon spoke with all the authority of five years as chairman of the B.B.C. He said he had no prejudice against private enterprise or competition in the appropriate place, but was the B.B.C. such a place? There were only three countries in Europe which had commercialized broadcasting: Luxembourg, Monaco and Andorra; otherwise all Western Europe had refused to have anything to do with it. He thought educationists would protest as strongly against the present White Paper as against the first.

Viscount Waverley, formerly Sir John Anderson, who spoke on the second day, said that it was fair to recognize that the Government had made a genuine effort in the White Paper to meet the objections to the original plan, but he was still unconvinced. He could not understand the

point of view of those who said there was a true analogy in the matter of advertisements between the Press and television. In the case of newspapers advertisers were guided by the general character of the paper and its readers and not by the quality of its leading articles, or the form of presentation of news. But it was very different in television; there an advertisement would be linked directly with an individual item in a programme. Neither the proposed Corporation who owned the stations, nor its lessees would be able to exercise effective control, thought Lord Waverley. He had had a fair experience of administration, and he regarded the task of exercising control under the conditions contemplated in the White Paper as "administratively impossible."

Earl De La Warr, Postmaster General, who opened for the Government, said that the Government held themselves free to hear the views of Parliament before preparing detailed legislation; he promised serious attention to the ideas aired in the debate. He refused to assume that all advertisers wanted to debase programmes, and was sceptical of Lord Hailsham's fears that advertisers would influence programmes towards the type of thing most profitable for them. The opposition to commercial television, said Lord De La Warr, was based on distrust of those engaged in the trade of the country, and for that reason he asked the House to reject it.

Lord Brabazon, in a typically robust speech, made a shrewd point when he drew attention to the strong B.B.C. connections of most of the speakers for the motion. He suggested that the B.B.C. should concentrate on coloured television if it was not to be left behind. The Archbishop of Canterbury, who appears to be taking a relatively neutral position, posed the question how far it was wise to put a great deal more of our national resources into accelerating television development.

Lord Salisbury, making the final reply for the Government, challenged intellectuals of the type of Lords Waverley, Brand and Jowitt to leave their ivory towers. If they went out into the common world of business they would find it different from what they thought it to be. Neither businessmen, advertisers nor audiences were wicked depraved people. Under the Government's proposals programmes would not be linked with advertisements and the Corporation would be free to see that a proper standard was kept; the programmes would be in fact subject to powerful checks which did not exist in the United States.

The Government, of course, carried the day by seventy votes in the Lords, but the eighty-seven cast against them, which figure includes a number of their own supporters, are bound to make them look to the Commons' discussions with a little trepidation.

Report on the B.I.F.

An interesting announcement recently made in the Commons was that of Mr. Heathcoat-Amory at the Board of Trade when he told Mr. Langford-Holt that the Exhibitions Advisory Committee had made a report on the B.I.F. which was to be published as a White Paper.* The Government had accepted the recommendations of the Committee that industry should take a more direct interest in the control of the London Section of the B.I.F. It was proposed that responsibility for it should be transferred from the Board of Trade to a new non-profitmaking company limited by guarantee. This company would have a board nominated by trustees representative of industry generally, including, he hoped, the T.U.C., and the Government would assist by guaranteeing the initial working capital for five years. The Birmingham Section would continue to be run by the Birmingham Chamber of Commerce, which would have one nominee on the board of the new company.

Mr. Bottomley, Labour Member for Rochester and Chatham, who has seen ministerial service at the Board of Trade, said the suggested change was a serious matter demanding careful investigation.

*This has now been published and is reviewed on page 1283 of this issue.—Editors, *Electrical Review*.

B.E.A.'s North Wales Experiment

It is reported that Idris, Ltd., the owners of the land concerned, have refused the British Electricity Authority permission to make trial bores near Cader Idris for the purpose of its pumped-storage experiment. They said that it was not their intention to use the land for commercial purposes as they wanted the area preserved for its natural beauty. If the Authority wanted to proceed it should apply for permission from the Merioneth Park Planning Committee.

PARLIAMENTARY NEWS

By Our Special Reporter

AFTER a two-day debate in the House of Lords, Earl Halifax's motion disapproving the Government policy on television (moved in the absence of Earl Halifax through illness by Viscount Hailsham) was rejected by 157 votes to 87. In the course of the debate, Earl De La Warr, the Postmaster General, pointed out that the White Paper on television stated that there must be not only an alternative programme, but that that programme must be provided by minds other than those of the B.B.C. If privately financed companies could not make television pay that was their affair. The White Paper also stated that new programmes would be alternative to and not a substitute for existing programmes, and that the public corporation to be set up would own and operate the transmitting station and would be responsible for maintaining the standard of programmes. It would hire facilities or contract with programme companies on terms and conditions and for periods that it laid down on behalf of the Postmaster General. If, as might well happen, different companies were allowed to operate on one station, it would be for the corporation to ensure the proper planning and balance of programmes. There would be no sponsoring. Most programme makers would hire time to advertisers either for their advertisements or for documentaries, but at all times there would be a clear distinction between what was presented as advertisement and as a programme, and programme makers at all times would be solely responsible for their programmes, and not the advertisers. At no time would the interruption of programmes be permitted. He believed the safeguards provided were watertight and there was no comparison between the system now operating in the United States and that which the Government proposed to put into operation.

Television in Northern Ireland

In the House of Commons Captain Orr asked the Assistant Postmaster General when the permanent television transmitter for the Northern Ireland region was expected to come into operation; and what was likely to be its area of coverage.

Mr. Gammans said that the B.B.C. expected that a permanent television transmitter at Divis, in Northern Ireland, would be ready to take over the service from the existing temporary transmitter before the end of 1955. The number of people within range of television would then increase from half a million to about a million. The area of reception should include the towns of Newry in the South, Dungannon and Dungiven in the West, Coleraine in the North, and Donaghadee in the East.

Shared Telephones

Lord Ammon asked the Government since when it had been the practice to insist that a subscriber, who had rented a telephone in the London area for a number of years, should surrender his individual service and share a party line.

Earl De La Warr said that since January, 1948, they had had to ask new and removing residential subscribers to accept the liability to share their telephone lines when necessary, and many residential subscribers given service since 1948 had in fact shared their lines from the outset. Successive Governments had been obliged to continue this policy because of the shortage of telephone cables, and it had enabled them to give telephones to over 300,000 people who would otherwise still be on the waiting list. He disliked the compulsory undertaking, and he could give an assurance that as soon as they were in a position to do so they would offer subscribers a free choice between exclusive and shared-service telephones.

Cost of Beacons

Major Anstruther-Gray asked what was the average cost per year of operating a pedestrian crossing beacon.

Mr. Hugh Molson, Parliamentary Secretary to the Ministry of Transport, said that the flashing beacons had not been working long enough to make a reliable estimate but he was informed that the lighting of the beacon (including the cost of electricity, renewal of lamps, general maintenance and the necessary travelling) might be about £4 per beacon per year.

Wholesale Cable Agreement

Mr. Swingler asked the Minister of Supply if he would now introduce legislation to give effect to the recommendation of the Monopolies Commission, with regard to the supply of insulated electric wires and cables, that exclusive dealing provisions in agreements with wholesalers should be brought to an end.

Mr. Low said that the Minister hoped to be in a position to make a full statement shortly.

Automatic Train Control

In reply to Mr. Nabarro Mr. Molson said that the Minister of Transport had now considered all the implications of the report upon the Harrow train disaster. As he stated on 6th

July, the Transport Commission had decided to extend automatic train control. Trials with new equipment designed for this purpose were being conducted on the Barnet–Huntingdon line. In addition, multi-aspect colour light signalling was being extended where justified by the traffic. The standards for new signalling works were laid down in the official publication entitled "Requirements for Passenger Lines and recommendations for Goods Lines."

Copper Supplies

Replying to Mr. Simmons, the Minister of State, Board of Trade (Mr. Heathcoat Amory), said there was no serious shortage of copper at present and such local shortages as did exist while the market was becoming adjusted were met by the Government broker for the time being. Until further notice the Ministry of Materials was prepared to release copper, usually through the Government broker, and at a small premium so as to avoid interference with the establishment of normal commercial arrangements, to those consumers who had not covered all their requirements from commercial sources.

Building Licences

Sir David Eccles, Minister of Works, made a statement about building licensing arrangements for 1954. He said that the free-limit for industry and agriculture would be raised from 1st January to £25,000. The free-limit for all other work would be raised to £1,000.

Local authorities would give licences automatically for houses up to 1,500 sq ft in size and for not more than 50 houses at a time. They would also have discretionary powers to issue licences for houses up to 2,500 sq ft. Proposals for houses in excess of that area would be referred to the Minister of Housing and Local Government.

As a further step towards simplifying licensing procedure, applications for building licences for all classes of buildings except housing should be sent to the Regional Licensing Office of the Ministry of Works.

Transatlantic Link

First Telephone Cable to Cost £12½ Million

IN the House of Lords on Tuesday the Postmaster General announced that he had just signed an agreement with the American Telegraph and Telephone Co., the Canadian Overseas Telecommunication Corporation and the Eastern Telephone and Telegraph Co. of Canada for the provision of the first transatlantic telephone cable. The new cable, he said, would transform telecommunications between this country and the North American Continent. The cost of the cable would be about £12½ million and the work of laying it, to be carried out by H.M. cableship *Monarch*, would take about three years.

I.E.S. Summer Meeting

NEXT year's summer meeting of the Illuminating Engineering Society will be held at Southport from 18th to 21st May. The theme of the meeting is that of practical applications and the programme includes a number of papers of interest to those not directly concerned with the lighting industry.

The papers to be presented are as follows:—"Lamps and their Uses," by Dr. J. N. Aldington (Siemens Electric Lamps & Supplies, Ltd.); "Street Lighting of a Large London Suburb," by A. T. Durbridge (Eastern Electricity Board); "The Decorative Approach to Commercial Lighting," by André Claude (Claude, Paz & Silva, Paris); "Home Lighting," by A. H. Young (Troughton & Young, Ltd.); "Lighting for Plant Growth," by A. E. Canham (Electrical Research Association); and a series of papers on the economics of different types of industrial lighting installations, including hot cathode, cold cathode, high-bay mercury and blended light installations (to be given by consulting engineers and factory engineers).

The programme will also include a display of new lighting equipment, and a number of educational and technical visits. Participation in the meeting is not restricted to members of the I.E.S.; anyone interested in any of the papers or visits may attend. Full details of the meeting will be available shortly and may be obtained from the Secretary, Illuminating Engineering Society, 32, Victoria Street, London, S.W.1.

PRICES OF MATERIALS

IN the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £150 0s 0d
COPPER, H.C. Electro	ton £232 0s 0d
Fire Refined 99·70 per cent ..	ton £231 0s 0d
Fire Refined 99·50 per cent ..	ton £230 0s 0d
COPPER Tubes	lb 2s 3½d
Sheet	ton £263 15s 0d
H.C. wire and strip	ton £268 15s 0d
LEAD, English	ton £90 5s 0d
Foreign	ton £89 0s 0d
MERCURY	flask £61 15s 0d
TIN	ton £640 0s 0d
ZINC, G.O.B. Foreign	ton £71 0s 0d
Electrolytic	ton £72 15s 0d
BRASS Tubes	lb 1s 10½d
Sheet	ton £239 15s 0d
Wire	lb 2s 5½d
PHOSPHOR BRONZE	
Wire	lb 3s 8½d
RUBBER, No. 1 R.S.S. spot ..	lb 17⅛–18d

The Ministry of Materials has announced the following reductions in its selling price for tungsten ores of standard 65 per cent grade and ordinary quality as from 1st December:—Wolframite from 210s to 195s; Scheelite from 195s to 180s per long ton unit delivered consumers' works.

The E.P.E.A. Dinner

Extension of Domestic Electrification Urged

MORE than 450 members and their guests attended the twenty-sixth annual dinner given last Friday by the Southern Division of the Electrical Power Engineers' Association to the National Executive Council. Councillor J. Parr-Morley (chairman of the Division) presided. Proposing the toast of "The Association," the Parliamentary Secretary to the Ministry of Fuel & Power, Mr. L. W. Joynson Hicks, compared the present position of the electricity supply industry with that of forty years ago when the Association, which had a membership to-day of 13,000, was started in embryonic form. Then, he said, 4 or 5 lb of coal was burned to generate each kWh compared with about 1 lb of a low grade in a modern power station.

He foresaw no slackening of demand during the next forty years; in the U.S.A. 3½ times as much electricity as here was used to provide the industrial power essential to productivity, yet the present rate of increase was greater. Regarding domestic electrification, he suggested that more imagination should be shown in producing means (which only electricity could provide) of meeting housewives' needs in addition to such items as cookers. On power station engineers rested the responsibility for increasing operation efficiency to offset the serious effects to consumers of steepening capital costs of plant. There was a great need for more highly qualified technologists to cope with the problems which would be raised by new developments, such as the gas turbine and nuclear devices.

Responding, Mr. J. Jones (president, E.P.E.A.), expressed the conviction that in such developments members of the Association would play their part. The E.P.E.A. was proud of its position in its consultative and negotiating capacity and looked for corresponding rewards.

Proposing "The Electricity Supply Industry," Dame Caroline Haslett (Director, Electrical Association for Women) mentioned her introduction to the industry 29 years ago, when she met many of the pioneers, including Ferranti, Parsons and Crompton. No informed person, she believed, could fail to appreciate the magnificent job that had been done since nationalization in extending the benefits of electricity—the greatest gift of science to mankind. To housewives it meant real emancipation from drudgery. Dame Caroline paid a tribute to the enthusiastic Parliamentary work of Mr. A. M. F. Palmer.

In response, Sir Joseph Hallsworth (chairman, North Western Electricity Board) referred to the electricity supply industry as the "too silent service." It could perform more functions than any other service and if consumers had freedom of choice and if capital were made available to meet their demand and there were no restraints, there could be no doubt of the result. The industry was composed of diverse elements working with a oneness of purpose. The E.P.E.A. had been a power in creating conditions in which collective bargaining and advisory services had achieved great success. The chairman expressed the thanks of all present to Mr. F. H. Smethurst who had been responsible for arranging the dinners for twenty-two years, except during the war period. The evening concluded with dancing to Tommy de Rosa's orchestra.

New E.A.W. Branches

TWO new E.A.W. Branches were recently formed—the Eastbourne and District Branch, and the Bromsgrove and District Branch.

At the Eastbourne meeting the Mayor, Alderman E. C. Martin, was in the chair, and the Mayoress was present. Speakers were Dame Caroline Haslett; Mr. C. F. Wells (S.E.E.B.); Miss Craig (Co-Principal of the Eastbourne School of Domestic Economy, Ltd.); Mrs. Leslie Orr; Alderman Miss Thornton and Councillor Mrs. Llewellyn. The chairman of the new Branch is Councillor Mrs. Underhay, the deputy chairman, Mrs. E. Boydell, the hon. secretary, Mrs. Dumbrell, and the hon. treasurer, Mrs. Alce.

At Bromsgrove the chairman is Mrs. B. Holt. At the inaugural meeting Mrs. A. L. Hayes, E.A.W. Area Organizer, gave an address.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Testing Directional Circuits

THE article published under this heading in the *Electrical Review* of 13th November by Mr. J. H. Toule, B.Sc., is most timely. I have for some years advocated that tests to check the direction of protection systems having a directional feature should be carried out before final commissioning tests. But not only should this apply to directional equipments but also to devices which operate from groups of current transformers, such as unit or balanced current systems of protection. In other words, all circuits should be checked before the final commissioning stage is reached, especially if their correct operation is dependent upon the polarity of current transformers only or on the combined effect of current transformers and voltage transformers.

As Mr. Toule mentioned in his article, to achieve this it is necessary to use some form of d.c. flick testing. Experience indicates that this form of testing eventually saves a great deal of time in commissioning the equipment associated with large high voltage substations and generating stations. I was associated with the development of a flick tester which is quite simple to use. The information gained from the test results with this instrument, together with a technical knowledge of the circuits, enables one to decide whether or not a correct system of connections does in fact exist. Mr. Toule does not, however, say in his article whether he relies completely on the tests he describes or whether he confirms the results with actual load-flow tests.

I am of the firm opinion that in all systems of protection the polarities and validity of the connections must be finally checked by a load-flow or short-circuit test. If the test procedure is complicated, it requires a high standard of technical knowledge and experience to apply it. Under present day conditions, therefore, sound reasons exist to substantiate my views. Consequently, I strongly suggest that if d.c. flick tests were applied generally in the manner that I have mentioned, wiring and assembly errors would be revealed long before the equipment concerned was ready for service.

Portchester, Hants. M. P. MACON, A.M.C.T., A.M.I.E.E.

Electric Traction Considerations

I WOULD like to support Mr. Honey's plea for a better realization of the value of the traction load, and to endorse his view that the decline in our home market for electric street traction vehicles is hampering our export trade.

In this respect, it is most regrettable that Leeds, having purchased two modern rail-cars of a type which would be likely to find a large market overseas, has now decided to dispense with electric traction within ten years, without awaiting the results of trials with these new cars. One reason given is the increased cost of electricity for traction in Leeds, and although this and the other reasons advanced for abandonment of the Leeds trams—which on two routes are completely segregated on reserved tracks almost to the city centre, and are really electric light railways—are very weak, it is certainly a pity that this increase should have been made in view of the danger that it may lead to the complete loss of this valuable traction load.

It is pleasing to note that electrical manufacturers have at last started to give publicity to the advantages of the modern tram, as well as the trolley-bus. In the past, the obsolescence of the tram was proclaimed by the supporters of the diesel bus, and electrical manufacturers seem to have accepted this without protest, in the hope that trolley-buses would be used for tram-way replacement. In Continental Europe, modern trams have been introduced in all the main cities, and trolley-buses have been used more often to displace diesel

buses on less busy routes than to replace trams.

There are still eight large tram systems in operation, and it is in the interests of the electrical industry, as well as of the public, that they should be retained and modernized. This is not, however, all that can be done. The success of 50 c/s electrification of railways in France and at Morecambe, opens up vast possibilities for the development of local electric rail services for medium sized towns; there are many such towns in which rail tracks are not used to their maximum capacity. A local system could be introduced, using existing railways where convenient, and new reserved track roadside light railways elsewhere.

In larger cities, such as Birmingham, a similar scheme would be possible, incorporating also many of the former tramway reservations, but in this case normal d.c. electrification would be justified.

*London, S.W.*18. F. K. FARRELL, B.A., A.M.I.E.E.

Domestic Development

I HAVE read with great interest Mr. E. A. Fowler's comprehensive views under the title of "Domestic Development" in your issue of 13th November.

Myself a commercial electrical engineer in the supply industry, I am happy to find Mr. Fowler's close touch with, and full appreciation of, the small day-to-day commercial transactions. The understanding of the irritations to which showroom staffs are subjected should be a source of encouragement to them.

I do not, however, agree with the suggested course of training for new entrants. The author rightly requires these to obtain knowledge of their subject. This knowledge is often the key to the consumers' goodwill. In my opinion the soundest and quickest method of acquiring knowledge of the apparatus is by working in the installation and maintenance departments handling this gear. I know of no clerical training that can produce anything comparable with the reassuring confidence a sales-trained practical man presents to a prospective purchaser. Experience shows that the most successful district is one which provides an avenue of promotion from the practical to the sales side. Some clerical training is necessary but I hope the practical experience will not be omitted.

Mr. Fowler regarded these trainees as potential senior commercial officials. The senior commercial officials in a district are at present the district commercial engineer and his first assistant commercial engineer. In all advertisements for these positions engineering training and experience are asked for.

I appreciate that the article was primarily concerned with domestic development and trust that in a more detailed description of the entrants' training schedule engineering and practical training would be included.

"COMMERCIALIZED."

Selling Electric Cookers

MR. DAVIES can hardly expect to go unchallenged for the references made to lady demonstrators in his letter on "Selling Electric Cookers."

It is perfectly obvious that he has little knowledge of the specialized training which has to be undertaken by a would-be demonstrator before she is offered a position in the electrical industry. She has to undergo a two-year full-time course in domestic science, take a somewhat stiff course in electricity, and possess the E.A.W. Certificate in Electrical Housecraft, plus at least twelve months as a trainee, before she can qualify as a demonstrator.

Therefore her knowledge is not only that obtained from books, but like the wise and best informed she continues to obtain a great deal of helpful knowledge from books and especially the electrical Press.

I feel that the remark about too much "side" when calling upon consumers deserves to be ignored—being anything but the general attitude met with—but there is one very important point which I would like to make and one which would greatly assist in carrying out all lecture and demonstration work—that of far greater interest and closer co-operation between all commercial staff. Equipment and apparatus invariably arrives on the scene far too late to give the demonstrator a fair chance of proper preparation. Also it is brought complete with all the filth collected in storage and often parts are missing.

I am confident that development of a better understanding, closer co-operation and a spirit of real goodwill would do much to produce a greatly increased turnover of all apparatus.

"DEMONSTRATOR."

RECENT INTRODUCTIONS

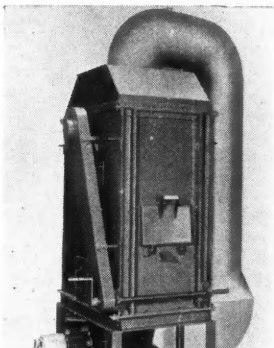
Notes on New Electrical and Allied Products

Forced Air Circulation Oven

THE vertical, manually operated, forced air circulation conveyor oven made by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, occupies little floor space. It will give a prolonged heat treatment but will also enable heat treated parts to be delivered individually as required.

The oven is of double cased construction and is well insulated. Inside are twelve perforated swing trays, suspended from rods, which are brought to the unloading position by twin chain conveyors running over sprocket wheels. These wheels are turned, through reduction gears, by a handle outside the oven. The trays can be loaded or unloaded from either side of the oven, and the conveyor equipment can be operated from either side. The oven is rated at 25 kW for operation at 250 deg C on a three-phase, four-wire supply. Its heating elements are fitted in a separate case, situated outside the oven body between the fan outlet and the oven. The centrifugal fan is directly connected to a three-phase induction motor.

The oven is equipped with automatic control and is provided with an excess temperature cut-out. Associated switchgear and temperature indicators are mounted in a separate cubicle. The oven can be supplied for use with special atmospheres.



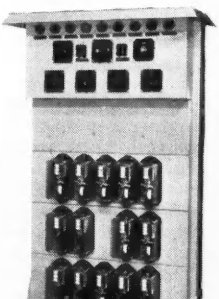
G.E.C. forced air circulation oven for heat treatment

Control Relays

The "CR" range of four solenoid operated a.c./d.c. control relays now being made by the JOHN MORRIS ELECTRICAL ENGINEERING CO., LTD., Vulcan Road, Bilston, Staffs, covers practically every requirement for loads up to 15 A 250 V a.c., 10 A 440 V a.c. and 2 A 250 V d.c. All four types employ the same base and cover mouldings, giving complete interchangeability of mounting. The operating mechanism, together with its coil and moving contacts, can be removed as a single unit, leaving the base and all external wiring undisturbed.

Wiring is easy and the cable is bolted directly to the fixed contacts. All terminal screws are of stainless steel. Large contact gaps, double-break self-aligning moving contacts and a positive lock in both the open and closed positions eliminate contact bounce and ensure a high rupturing capacity for the main contacts.

A dust-proof transparent cover is provided and all parts are "tropicalized." The design,



John Morris "CR" relays incorporated in an automatic switchboard

coupled with the use of non-hygroscopic mouldings, permits safe operation up to 660 V between adjacent contacts. All relays are flash tested to 2,500 V a.c.

Type " D " is a direct acting relay fitted with five normally open and five normally closed main contacts. Type " M " is a time-delayed unit with four normally open and four normally closed main contacts and one direct-acting auxiliary change-over contact. Type " L " has four directly acting normally open and four normally closed main contacts and one auxiliary contact arranged for adjustable time-delayed operation. Type " T " is a time-delayed unit with five normally open and five normally closed main contacts; four scales are available giving delays of 0·3–1·5, 2–10, 10–50 or 30–250 seconds.

The illustration shows a typical example of one of a number of diesel-generator control panels supplied to the order of Mirrlees, Bickerton & Day, Ltd.

Spray Gun

A heavy duty production spray gun made by B.E.N. Patents, Ltd., High Wycombe, for use with paint spray equipment is well balanced and weighs only 2½ lb with syphon cup. The one-piece body and handle is of drop forged duralumin, while the trigger and spreader cap are hot brass forgings. The nozzle is in stainless steel. A variable spray control needle enables the operator to vary the width of spray or change from round to fan shape without interrupting spraying.

Shaving Mirror

A shaving mirror now available from Coalport Metalware, Ltd., Coalport, Ironbridge, Shropshire, is double sided, magnifying one side and plain the other. The glasses, cushioned in soft rubber within the chromium plated brass frame, are fitted by a ball joint to a streamlined base mounted on rubber buffers. Assembled in the base are a mains voltage lamp and lamp-holder and the light from the 2in domed glass window illuminates the face.

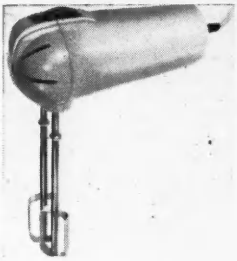
Two sizes are available—the 6in model (970) retailing at £2 13s 6d, plus £1 6s purchase tax in the United Kingdom, and the 7in model (975) priced at £2 17s 2d, plus £1 7s 10d tax.

Portable Food Mixer

The " Valmix " portable electric food mixer which has recently been placed on the market by Valmade, Ltd., New Chapel Road, High Street, Feltham, Middlesex, weighs little more than 4 lb. Housed in a streamlined cream plastic case, that is so shaped as to be easily gripped in the hand, the mixer also incorporates a thumb switch control.

Two stainless steel beaters are provided and these are interchangeable. The universal

" Valmix " portable food mixer



200/250 V motor is sturdily constructed with strong diecast end frames and fan cooled. Consumption is in the region of 45 W. Other voltages (24, 32, 50 and 110 V) can be supplied to order. The retail price is £5 5s 6d, plus £1 19s 6d purchase tax in the United Kingdom.

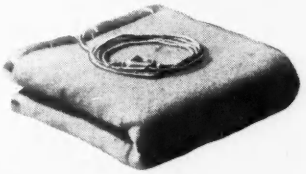
Illuminated Bell-Push

An illuminated bell-push which, in addition to illuminating the push-button, also lights up the keyhole and the name or number plate is obtainable for 7s 6d from the distributors for the British Isles and Eire, Maurice End, Ltd., Endura House, Blackfriars Street, Manchester, 3.

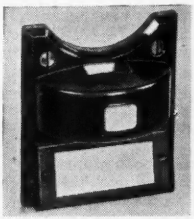
Electric Blanket

The new " Warm-Well " electric blanket placed on the market by Premier Electric Heaters, Ltd., Keeley Street, Birmingham, 9, is made of a soft woollen material and the edges are bound with rayon satin.

The completely protected element is so designed that thermostats are unnecessary,



Premier " Warm-Well " electric blanket



Above : **Illuminated bell-push**

Left: **" Coalport " electric shaving mirror**

thereby removing the cause of radio and television interference. The blanket measures 54in by 30in and can be supplied in three colours, pink, blue and green, and two voltage ranges, 200/220 V and 230/250 V, both being suitable for a.c. or d.c. A 5 A on/off switch and 10ft of flexible cord are fitted.

The price is £5 18s, plus £1 1s 6d purchase tax in the United Kingdom, and washable poplin covers in the same three colours as the blanket are extra, price £1 5s, plus 4s 7d purchase tax.

Home Freezer

The HF. 41 "Prestofreeze Junior" home freezer mentioned and illustrated in our review of the Dairy Show on 6th November, has a net storage capacity of 4·05 cu ft. Special features include a counterbalanced lid, a chromium-plated "grip type" locking handle, four produce baskets, a hermetically sealed refrigeration system guaranteed for five years, automatic overload protection and dry wall freezing, with coils completely surrounding walls and floor.

The freezer, which is obtainable from the PRESSED STEEL CO., LTD., Cowley, Oxford, costs £87 (plus £30 4s 6d purchase tax in this country).

Special Service Valves

A range of valves has been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, for use in equipment subject to mechanical vibration and shock greater than is met in normal broadcast and commercial apparatus.

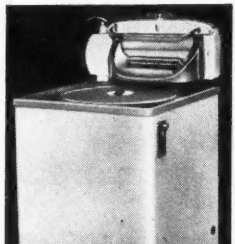
The design of these "Q" valves is based on the field performance of popular types and includes double getter supports to prevent resonant vibration and reduce microphony, double micas with pre-bent points to locate the system accurately within the bulb and cut down inter-electrode "shorts," the strapping of electrodes to the micas so that the assembly is firmly locked and the initial low order of microphony maintained throughout the life of the valve; "belled" cathode ends to give improved heater-cathode insulation; and a specially selected button seal which, combined with strain-free glassware, ensures freedom from failure in service.

The "Q" series valves are made under strictly controlled conditions in which many additional operations have been added to the standard manufacturing process, particular care being taken to exclude dust and "lint" at all stages. The completed valves are subjected to a prolonged soak test to eliminate early failures and to stabilize the electrical characteristics. In addition, batch sampling is carried out, the sample valves being subjected to life and vibration tests.

The characteristics of "Q" valves are identical with those of their "Osram" prototypes. They have been developed for use in special industrial and communications equipment and are not intended for use in domestic radio and television receivers. They are not subject to purchase tax.

Washing Machines

In addition to their "L" type "Auto-Washer," H. FISHER (OLDHAM), LTD., Oldham, Lancs, have now introduced the "Auto-Home" laundry washing machines models "ER 1" and "ER 2." The "ER 1" is an all-electric machine fitted with an auto-pump; it has a capacity of 9 lb of dry clothes. The "ER 2" has in addition a 2 or 3 kW heating element. Both types are



Fisher "Auto-Home" laundry model "ER 2"

fitted with power wringers, and are finished in white or cream enamel with vitreous tubs and tops. In their new design Fishers maintain the lower height of their "L" type washer but the "ER" models have larger cabinet space, as well as a larger gearbox and agitator. The gear drive for the wringer is designed to take an electric rotary ironer.

The prices of the respective models are £51 19s 6d, plus £19 9s 10d purchase tax in the United Kingdom ("ER 1") and £55 2s 6d plus £20 13s 5d purchase tax ("ER 2").

Indian Railway Electrification

It is reported by *Indian Trade and Industry* that the Indian Minister for Railways, Mr. Lal Bahadur Shastri, recently said that his Ministry proposed to electrify the Howrah-Mogalsarai section to cover the entire mine belt for better transport of coal and minerals. The scheme would cost Rs 280 million. He also said that the electrification of the Calcutta suburban railways would be completed as soon as possible. A chief engineer had been appointed to prepare all projects for the electrification of railways.

British Industries Fair

Review and Recommendations

EARLY last year, at the request of the President of the Board of Trade, the Board's Exhibitions Advisory Committee appointed a sub-committee to review the existing arrangements for the British Industries Fair and, if found necessary, advise the President regarding desirable changes, and whether responsibility for the organization and administration of the Fair should be assumed by industrial and commercial interests; and to deal with the general financial aspects, including the amount to be spent on publicity.

The sub-committee, under the chairmanship of Sir Ernest W. Goodale, has produced a report which has been published as a White Paper (Cmd. 9013, H.M. Stationery Office, 6d). After a concise history of the Fair the report shows that the Government's contribution to publicity reached a figure of £108,480 in 1951 falling to £79,793 in 1952 and £85,576 this year. Contributions of £9,578 and £9,424 were made in 1952 and 1953 by the Birmingham Chamber of Commerce, organizers of the Birmingham Section.

London and Birmingham Sections

Throughout the report the London Section is primarily dealt with and most of the recommendations are concerned with this Section. The sub-committee is not in favour of concentrating the whole of the Fair in London, considering that the permanent 25 acre buildings at Birmingham should be retained. It is also noted that while (with the exception of 1952 and 1953) the London Section has run at a loss the operation of the Birmingham Section, managed as a commercial enterprise by the Birmingham Chamber of Commerce, results in a surplus.

A preliminary note in our last issue outlined the sub-committee's principal proposal—the formation of a public corporation to take over the Board of Trade's responsibilities as from and including the 1955 Fair. The corporation should be empowered to do more than develop the London Section; it should be a national corporation responsible for co-ordinating policy for the Fair as a whole with power to delegate to sections the management of those sections, including "any additional sections which might develop." Management of the Birmingham Section would be left to the Chamber of Commerce.

Composition of Corporation

The chairman should be a prominent industrialist and the membership of the board of directors should comprise one nominee each of the Birmingham Chamber of Commerce and the Government, and four independent members. It is recommended that the appointment of the last-named and of the chairman should be in the hands of three trustees who should be the presidents for the time being of the Associated British Chambers of Commerce, the Federation of British Industries and the National Union of Manufacturers.

The sub-committee does not favour the erection of new buildings solely for the purpose of the London Section but advises the close following of any proposals for the erection of exhibition buildings on the Crystal Palace site which would be a suitable place for the London Section.

The Government should guarantee the borrowing by the corporation of up to £100,000 working capital in the first five years of its operation; should ensure finance for overseas publicity on the scale of £100,000 per annum; and should make available £50,000 and £30,000 for home publicity in respect of the 1954 and 1955 Fairs.

Importance is attached to the retention of the Royal Family's interest in the Fair, advocacy for the Fair by H.M. Ministers, the continued co-operation of the Government's overseas officers with the new corporation and the continuance of the inaugural dinner at the Mansion House, London. The sub-committee recommends the immediate implementation of its proposals so that the corporation may be in a

position to promote the 1955 Fair and it asks the Government to make a statement on the future of the Fair as soon as possible.

Among the matters suggested for the corporation's attention is the possible extension of the scope of the Fair by (*a*) making it fully international or (*b*) including Commonwealth firms in the appropriate trade sections. In any event it is stressed that the Fair should continue annually and be more than a trade fair; "it should project British industry in the world and be a pageant of the best in British industry."

MALAYAN ELECTRICAL IMPORTS

THE trend of Malayan electrical import trade during the first half of 1953 was not uniform. While business in some lines continued to advance, in others there were declines. For example, there were increases in wires and cables (except submarine), generators and the larger motors, cooking and heating appliances and most radio equipment, but on the other hand trade in accumulators, torch batteries and lamps, other than fluorescent, fell off.

Because of amplifications in the statistical classification this year, exact comparison with 1952 is not always possible. Newly recorded items include electric refrigerators, excluding parts, to a total value of 2,382,000 Malayan dollars, with the United Kingdom taking two-thirds of the business; and television and radio sets, $1,338,000, with the Netherlands the leading supplier. The total value of the imports of electrical equipment was $38,603,000, of which the United Kingdom accounted for $31,908,000; Germany, $1,435,000; the Netherlands, $1,200,000; and the United States, $1,212,000. Comparative figures of the leading groups are given in the accompanying table. (The Malayan dollar equals 2s 4d.)

Class of Goods	Jan-June 1953 $(000)	Inc. or dec. on Jan-June 1952 $(000)
Automobile, etc., lamp bulbs	45	− 72
From United Kingdom	29	− 24
„ Hungary	12	− 13
Flash, radio panel and cycle dynamo bulbs	109	− 252
From Netherlands	64	+ 7
„ Hongkong	28	+ 3
Fluorescent lamps	124	+ 39
From United Kingdom	65	+ 27
„ United States	49	+ 27
Flat irons	159	− 175
Electric light and signal equipment for vehicles	1,222	†
From United Kingdom	263	†
„ Netherlands	309	†
„ Germany	614	†
Wires and cables, not telegraph or telephone, rubber insulated	3,374	+ 503
From United Kingdom	3,181	+ 348
„ Germany	85	+ 68
Ditto, insulation other than rubber	4,459*	+ 2,845
Ditto, telegraph and telephone, submarine	126*	− 122
Ditto, ditto, other	1,121*	+ 924
Ceiling fans	1,334	+ 374
From United Kingdom	1,114	+ 364
„ India	213	+ 49
Table fans	529	− 259
From United Kingdom	368	− 54
„ Japan	114	− 156
Other electric fans	145	+ 19
From United Kingdom	97	− 6
„ Netherlands	28	†
Elec. cooking and heating appliances	865	+ 264
From United Kingdom	810	+ 260
Accumulators	1,232	− 887
From United Kingdom	872	− 1,157
„ Germany	125	+ 92
„ Australia	216	+ 166
Batteries, n.e.s.	347*	+ 99
Ditto, torch	605	− 2,277
From Canada	40	− 1,469
„ United States	161	− 929
„ Hongkong	118	− 82
Transmitters and radio communication apparatus, including radar, excluding valves	1,209	+ 661
From United Kingdom	1,068	+ 527
„ United States	100	+ 98
„ Netherlands	35	+ 35
Transmitting and industrial valves	146*	+ 53
Other valves	168	− 85
From United Kingdom	92	− 22
„ Netherlands	65	+ 4
Radio and electronic apparatus and accessories	956	− 108
From United Kingdom	810	− 67
„ Netherlands	76	− 44
Convertors and transformers	914	− 194
From United Kingdom	764	− 332
„ United States	54	+ 44
„ Hongkong	74	†
Generators	4,802	+ 1,689
From United Kingdom	4,485	+ 1,957
„ Germany	227	+ 108
Motors 25 h.p. and under	484	− 147
From United Kingdom	429	− 83
„ Sweden	17	+ 17
Motors 25 h.p. to 100 h.p.	367	+ 158
From United Kingdom	236	+ 46
„ United States	50	+ 41
Motors over 100 h.p.	222	+ 4
Switchgear	805	+ 20
Parts for electrical machinery and switchgear	629	†

* Mainly from United Kingdom.
† Comparative figures not available.

COMMERCE and INDUSTRY

Plumber Jointers' Wage Increase

New B.T.H. Turbo-Alternator Factory

AT a meeting of the Joint Industrial Council for the Electrical Cablemaking Industry held on 25th November the Standing Joint Committee on Plumber Jointers agreed terms of settlement of the application of the trade unions for an increase in wages to plumber jointers and to other grades coming within the scope of the plumber jointers Agreement. The Committee agreed that (*a*) the rates of pay of plumber jointers both in London and in the rest of the country should be increased by 1½d an hour; (*b*) consequential increases should be made in the rates of pay of plumber jointers' mates, of learners and probationers and of youths and boys; and (*c*) these increases should become effective as from the beginning of the first full pay period starting on or after 30th November. With the addition of the above-mentioned increase the new rates for plumber jointers will be 4s 0½d an hour in the London area (basic 2s with a bonus of 2s 0½d), and 3s 8¾d an hour throughout the rest of the country (basic 1s 9¾d with a bonus of 1s 11d).

In regard to the new rates for plumber jointers' mates, the Committee further agreed that at 85 per cent of the plumber jointers' rates these should be as follows:—In the London area 3s 5d an hour; throughout the rest of the country 3s 2d an hour.

Cardiff Capacitor Conference

We mentioned in our last issue the three-day conference on power factor at the South Wales Electricity Board Demonstration Theatre, Cardiff, last week, to which industrialists from all classes of industry in the East Wales area were invited.

The conference, said to be the first of its kind in the country, was convened by the South Wales Board, and was opened each day by Mr. W. A. Gallon, B.Sc., M.I.E.E., M.I.F., the deputy chairman of the Board. Subsequently, Mr. W. P. Warren, B.Sc., A.M.I.E.E., the Board's Section Head for Industrial Supplies, addressed the industrialists on the advantages to be gained both financially and technically by the improvement of power factor.

Excellent examples and working demonstrations of equipment for p.f. correction were arranged by British Insulated Callender's Cables, Ltd., Bryce Electric Construction Co., Ltd., Dubilier Condenser Co. (1925), Ltd., Ferranti, Ltd., Johnson & Phillips, Ltd., Philips Electrical Co., Ltd., Standard Telephones & Cables, Ltd., and Wego Condenser Co., Ltd.

So successful was the conference that it is proposed to repeat it for West Wales industrialists at Swansea early in the New Year.

Mr. W. P. Warren expounds the advantages of p.f. correction. Mr. W. A. Gallon, who presided, is seated at the table

Proposed Employers' "T.U.C."

Plans for a manufacturers' "T.U.C." to unify the great number of employers' organizations and to speak for the interests of all are to be put before the National Union of Manufacturers. This was announced by Mr. G. W. Donovan, of the Donovan Electrical Co., who told a National Union of Manufacturers' luncheon meeting in Birmingham last week that at the moment there were 3,800 different trade associations in the country.

"Instead of having a uniform voice it is a series of disjointed utterances," he said. "We have no organization to match up to the T.U.C.

I think it is most essential that we have some organization which can hold and maintain political power and political representation, because without political power there is no strength."

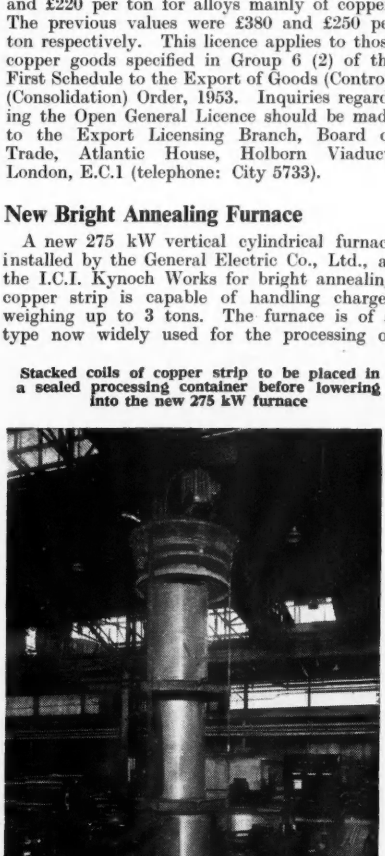
Export of Copper Goods

As from 30th November some copper goods can be sent to any country except China, Hong Kong, Macao or Tibet without export licence providing the value of the goods exceeds the value of the copper or copper alloy content, calculated at the rate of £330 per ton for copper and £220 per ton for alloys mainly of copper. The previous values were £380 and £250 per ton respectively. This licence applies to those copper goods specified in Group 6 (2) of the First Schedule to the Export of Goods (Control) (Consolidation) Order, 1953. Inquiries regarding the Open General Licence should be made to the Export Licensing Branch, Board of Trade, Atlantic House, Holborn Viaduct, London, E.C.1 (telephone: City 5733).

New Bright Annealing Furnace

A new 275 kW vertical cylindrical furnace installed by the General Electric Co., Ltd., at the I.C.I. Kynoch Works for bright annealing copper strip is capable of handling charges weighing up to 3 tons. The furnace is of a type now widely used for the processing of coiled ferrous and non-ferrous metals in controlled atmospheres. The charge is placed in a sealed container in which it is maintained in a controlled atmosphere throughout the process.

Stacked coils of copper strip to be placed in a sealed processing container before lowering into the new 275 kW furnace



Economic use of power is obtained by a system of heat recuperation whereby, as the container and its charge are removed from the furnace, their heat content is used to preheat newly charged pots. The installation has forced air circulation to speed this transfer of heat and to give effective heat recuperation even at comparatively low temperatures.

Several containers, each more than 3ft in diameter and over 12ft in length, are used to permit a continuous cycle of operations during which the charge is maintained in an atmosphere of cracked and burnt ammonia. To ensure uniformity of treatment the atmosphere is circulated over the charge by a fan fitted to the lid of each container. The charge may consist of two or three coils stacked one above the other. Special handling gear is used to up-end the coils on to perforated carrier plates.

Cooker Display

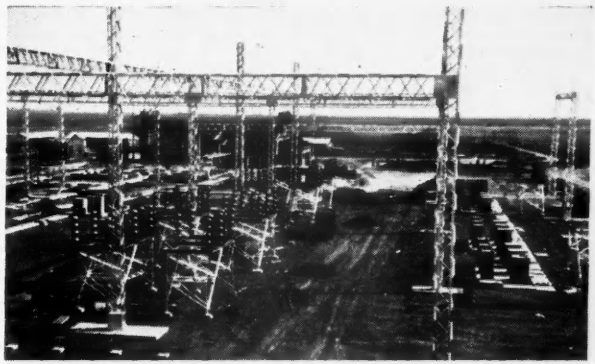
At the head office of Allied Ironfounders, Ltd., 28, Brook Street, London, W.1, on Tuesday last week Falco Electrical Appliances, Ltd., held a party to introduce the "Falco Royal" cooker. This cooker was illustrated in our Special Domestic Issue of 16th October when the principal details were given. It has an automatic timing arrangement by which the oven can be switched on at any time for a set period at the end of which it is switched off. The controls are set in the backplate, which is illuminated, and a kettle socket is also embodied in the side of the backplate. There are three radiant boiling rings in the hob-plate (two 1,700 W; one 900 W) and a separate 3,000 W grill of unusually large dimensions. Top and bottom heating (4,000 W) is employed in the oven and both the oven linings and the grill section are easily removed for cleaning.

Miners' Lamps for India

Oldham & Son, Ltd., announce that a contract has been received by their associated company, Oldham & Son (India), Ltd., of Madras, for large supplies of miners' cap-lamps and similar equipment for the Singarini Collieries. This marks the initiation of the company's scheme for the assembly and manufacture of such equipment by Oldhams (India) at their Madras plant. The Oldham lamp will be the first miners' cap-lamp to be manufactured in India. Hitherto, all modern mine lighting equipment has had to be imported.

Transmission Line Developments

To cope with expanding output Line Equipment, Ltd., has put in hand further considerable extensions to its Bridgend Works. These extensions include a complete new bay in addition to a large drawing office. For



"L.E ." 132 kV isolating switches under erection at Grootkop substation, South Africa

some time past the company's exports have accounted for well over 50 per cent of the total production, while equipment despatched to dollar areas includes isolating switches for system voltages ranging from 15 to 169 kV and for current ratings ranging from 200 to 2,000 A. One large order was received from the Electricity Supply Commission of South Africa covering 129 three-phase, vertical-break, rotating-type isolating switches for use on a 132 kV system, many of these being required in connection with large developments being undertaken in the Union of South Africa for uranium production. The company specializes solely in the production of air-break switch and fusegear for use in connection with high-voltage overhead transmission.

Batti-Wallahs' Society

Lt.-Comdr. Peter Scott, who was the principal guest at last week's luncheon of the Batti-Wallahs' Society, is well-known as the son of the late Captain Scott, "Scott of the Antarctic," as an artist, author and ornithologist. He is the founder and director of the Severn Wildfowl Trust, and it was in this capacity that he gave an interesting address on the research carried out by the Trust and its work for the preservation of wild geese.

In accordance with custom there will be no luncheon of the Society in December, the next function being on 27th January.

Competition for Young Farmers

Young Farmers' Clubs in the South-West are being invited to take part in a competition conceived and sponsored by Mr. G. H. Johnstone, vice-president of the National Federation of Young Farmers' Clubs and a member of the South Western Electricity Board.

Those entering the competition will be supplied with plans and details of an imaginary "Prospect Farm" and will then have to decide how to obtain a mains electricity supply and wire and equip the farmhouse and buildings to use the supply to the best advantage and to ensure the fullest economy and efficiency of working. Entrants must also prepare a statement comparing annual costs before and after the installation of electricity, assessing in addition the advantages which cannot be measured in money value. They will state future proposals for installing electrical equipment in order of priority. Entries are to be from mixed teams of six representative members, including at least two girls and with not more than two members over the age of 21 at 1st January next.

Cable for Beet Sugar Factories

To facilitate increased production of beet sugar at the Kidderminster and Poppleton factories of the British Sugar Corporation, Ltd., a complete re-planning of the l.v. power and lighting distribution schemes was recently undertaken. This work, involving the erection and jointing of some 4,000 yards of Ediswan paper-insulated mains cable in each factory, was designed and carried out by the Cable Contracts Department of the Edison Swan Electric Co., Ltd., in association with the Corporation's engineers.

Packaging Exhibition

With the rapid growth in the extent and interest in packaging throughout industry it has been found necessary to arrange for much more space at the next National Packaging Exhibition.

The Exhibition will be run in collaboration with the Institute of Packaging and will take place at Olympia, London, from 18th to 28th January, 1955. The exhibition will occupy both the Empire and National Halls.

Telephones for Newfoundland

Three telephone exchanges, complete with table and wall telephones, have been purchased by the Canadian National Railways for public use in Newfoundland. The equipment, known as the "Rurax" automatic telephone system, is a production of Ericsson Telephones, Ltd., who have also supplied the 445 table type and 145 wall type telephone instruments. The exchanges will be at Catalina, Clarenville and Bonavista and are capable of handling 50, 100 and 150 lines respectively. This equipment, which will be installed, operated and maintained

by the C.N.R., is of unit type construction and provides for easy extension should more lines become necessary. Sufficient terminations have been fitted to allow for the addition of party lines.

Cables for Russia

The final shipments of the important order for insulated cables for Russia secured in July last by Enfield Cables, Ltd., are now being made, one month in advance of the scheduled dates. The order—" non-strategic " in content—has involved the manufacture of 230 km (route length) of different types of power cables, 100 km (route length) of multicore signalling cables, and some 12,580 loop km of telephone cable. All this material has been delivered to Russian vessels loading at British ports for shipment to Leningrad and so onwards for ultimate consignment to " consumers located anywhere between Leningrad and Vladivostok," to use the words of the Russian buyers.

The ultimate use to which this cable will be put is not known. It was indicated in Moscow that some of the signalling cables might be required in connection with the great Volga correction scheme, which is part of the vast system of river correction and canal construction, which already links Moscow to the Caspian Sea and embraces about 6,000 km of navigable inland waterway.

The company says that the Russian negotiators proved to be most efficient in their dealings, on the technical as well as on the commercial side.

Baghdad Palace Contract

James Kilpatrick & Son, Ltd., of Paisley, have secured the contract for the complete electrical services in the New Royal Palace, Baghdad, for King Faisal II. The palace is being built in a large palm grove on the west bank of the Tigris near to the city boundary. The value of the electrical work is some £200,000 and it is hoped that all materials will be purchased in the United Kingdom. In addition to the installation of general lighting and power, the work involves special decorative and flood-lighting in the gardens and palm plantations and under-water lighting in the fountain courts. Electric clocks, telephones, fire alarms, servants' call and other systems, are also being installed in the Palace. The company's own engineers will be sent out to Iraq to control and supervise the work, which is expected to commence early next year.

Cable Makers' Wage Increase

The Joint Industrial Council for the Electrical Cable-Making Industry has advised its members of an award of increased wages by the Industrial Disputes Tribunal to all workers coming within the J.I.C. Schedules of Occupations. The award provides for an increase of 1d an hour for men of 21 years and over and ¾d an hour for women of 18 and over, with corresponding increases for juvenile workers. The latter are as follows:—½d per hour for youths of 15 to 17 and ¾d for those of 18 to 20; ½d per hour for girls of 15 to 17.

It is provided that the payment by results formulæ shall be maintained, with the new standard times rate. With this exception payment by results workers will not receive any further increase. The new rates take effect from the beginning of the first full pay period following 26th November.

Engineering Wages Disputes

Last week the Engineering and Allied Employers' Federation advised its members to keep their works open on Wednesday last in spite of the one-day stoppage called by the member-unions of the Confederation of Shipbuilding and Engineering Unions. It was stated that if possible work should be found for any employee reporting on Wednesday and payment should be made accordingly. At the time of going to press it was not known whether all members of the general workers' unions in the engineering industry had ceased work.

B.T.H. Expansion

The British Thomson-Houston Co., Ltd., has recently announced a ten-year programme for the expansion of its turbine business. The programme consists of two parts involving extensive re-equipment and re-organization of the Rugby turbine plant and the erection of a new factory at Larne, Northern Ireland. This new factory will concentrate on the manufacture of large turbo-alternators, of 30,000 kW and upwards, and will be built alongside the turbine blading factory already under construction by the Northern Ireland Government. Manufacture of turbo-alternator sets below 30,000 kW, gas turbines, marine main and auxiliary equipments, compressors, etc., will continue at Rugby but on a greatly increased scale. This programme will make a valuable contribution towards the reduction of unemployment in Northern Ireland.

Overseas Electrical Trade

In the monthly review of Britain's overseas electrical trade last week (page 1229) the values in Table I were incorrectly headed " September." The figures given, as stated in the article, were those for October.

Power Farming Conference

The fourth National Power Farming Conference is to take place at Cheltenham from 9th to 11th February next. The general theme will be the use of labour and machines for the most economic production in farming. Among the subjects for discussion will be grain handling and storage, and agricultural electrification.

Admission is free by ticket, and all details and accommodation reservations can be obtained

from the Organizer, National Power Farming Conference, Dorset House, Stamford Street, London, S.E.1.

Canadian Cable "Combine"

Nine Canadian producers of electric wires and cables are said by a special Commissioner appointed by the Government under the Combines Investigation Act to have been acting as a combine in the sale of their products. These companies are said to be responsible for over 90 per cent of Canada's production of this class of manufacture, four of them accounting for between 75 and 80 per cent of the total value. Public utilities have complained that on calling for tenders they have received identical offers from the companies but the companies' arrangements are said to have been such as to endeavour to conceal such practices.

Cables on the "Olympia"

All the varnished cambric insulated mains cables used in the new Greek Line passenger liner t.s.s. *Olympia* were supplied by the Edison Swan Electric Co., Ltd. The approximate total length of these cables installed in the liner is ten miles.

Refrigerators for Hong Kong

A firm of manufacturers' representatives in Hong Kong wishes to get in touch with makers of refrigerators and air conditioning equipment with a view to representation in that area. We shall be pleased to forward letters from any interested manufacturers.

Washing Machine Demonstration

On Wednesday last Hardman & Co., Ltd., electrical wholesalers, Rochdale, gave a special demonstration of the new "Autohome-Laundry" all-electric washers to authorized Fisher dealers throughout Lancashire, North Cheshire, Westmorland and Cumberland.

Coming-of-Age Bonus

Aerialite, Ltd., is twenty-one years of age this year and to mark the occasion the company has allocated £10,000 as a birthday bonus to all factory workers and office staff employed by the company and its subsidiaries.

Change of Name

Smith's Electric Vehicles, Ltd., has changed its name to Smith's Delivery Vehicles, Ltd. An additional factory is under construction to meet increasing production requirements, and will be ready for occupation in May next year.

Change of Address

The Institution of Heating and Ventilating Engineers has moved to 49, Cadogan Square, London, S.W.1. (Telephone: Sloane 1601 and 3158.)

Trade Announcements

As from 7th December the London Plant Branch office of **Crompton Parkinson, Ltd.**, will be moved from Crompton House, Aldwych, W.C.2, to 1-3, Brixton Road, London, S.W.9 (telephone: Reliance 7676). The other departments of the company will remain at Crompton House. The London Supplies Branch is already at 1-3, Brixton Road.

W. Edwards & Co. (London), Ltd., have now removed to their new premises, Manor Royal, Crawley, Sussex (telephone: Crawley 1500; telegrams: "Edcohivac, Crawley"). The Scottish branch is still at 44, West George Street, Glasgow.

The **Britannic Electric Cable & Construction Co., Ltd.**, can now supply "H.S.O.S." and "P.B.J." types of overhead cables with copper, aluminium alloy or all-aluminium conductors.

Catalogues and Lists

P. X. Fox, Ltd., Hawksworth Road, Horsforth, Yorks.—40-page illustrated catalogue covering a wide range of potentiometers for the electrical and electronics industries.

Enfield Cables, Ltd., Victoria House, Southampton Row, London, WC1.—Three illustrated leaflets on starter, lighting and general purpose cables for vehicles (E.N.202), non-bleeding cables (E.N.203) and shot-firing cables (E.N.204), and a catalogue dealing with the Enfield grid suspension wiring system (E.N.A.108).

Cambridge Instrument Co., Ltd., 13, Grosvenor Place, London, S.W.1.—Technical leaflet describing the company's three-term air-operated recording controller (311).

English Electric Co., Ltd., Foregate Street, Stafford. — Illustrated technical brochure concerned with multi-cylinder steam turbines (ST/108).

Denis Ferranti Meters, Ltd., Bangor, North Wales.—Technical catalogue describing the company's latest integrating meter, type TM3.

Merlin Mouldings, Ltd., 3, Central Parade, Bromley Road, Catford, London, S.E.6.—Priced leaflet illustrating the company's fluorescent unit.

James Neill & Co. (Sheffield), Ltd., Napier Street, Sheffield, 1.—Two illustrated leaflets dealing with swivel and box angle plates.

George White & Sons, Tyfield, Ongar, Essex.—Leaflet illustrating the White all-purpose alarm, designed to give warning of a mains failure or breakdown in poultry and pig rearing appliances.

Code Convertors

TWO papers presented at a meeting of the Radio Section of the Institution of Electrical Engineers on Wednesday dealt with code convertors for transferring messages from one communications system to another employing a different form of code.

One paper, by Messrs. T. Hayton, C. J. Hughes and R. L. Saunders (Cable & Wireless) reviewed the more common codes on the basis of traffic capacity and vulnerability to undetectable errors when interconnecting telegraph systems. The authors analysed methods of working and characteristic forms of distortion on both submarine and radio circuits in regard to their contribution to errors. In a consideration of means of detecting and correcting these errors, they described a 7 unit–5 unit electronic convertor and a 5 unit–7 unit mechanical convertor. They concluded that some forms of 7-unit code gave adequate protection against undetectable errors without dependence on operating skill. They suggested that replacement of the satisfactory 3-condition code, at present used on cables, by 5-unit code might be a natural sequel to the extended use of 7-unit codes on radio circuits, although there would be no appreciable improvement in cable performance to offset the heavy expense of conversion. The most suitable codes they regarded as those in which each symbol consisted of an arrangement of three marks and four spaces.

In the second paper Messrs. R. O. Carter and L. K. Wheeler (Post Office Research Station) described automatic convertors from international 5-unit teleprinter code to Morse code and vice versa, different equipments being used for the two directions of conversion. Transmission speeds of two systems were not usually identical and storage of the information in the form of Morse (or Wheatstone) perforated tape was adopted. In the designs discussed the input to the Morse teleprinter took the form of perforated tape associated with the tape-reading mechanism of a standard Morse printer, while the selecting and perforating mechanism of a Morse keyboard was incorporated in the teleprinter to provide the Morse perforated-tape output. The rest of the equipment was mainly electronic, containing both thermionic and cold-cathode valves.

Loudspeaker Design

IN a lecture to the I.E.E. Radio Section on recent trends in loudspeaker design, Major A. E. Falkis said that television sound required an extended high frequency response and that 33⅓ r.p.m. records and the improved broadcasting quality possible with short-wave frequency modulated systems called for speakers covering the whole audio range. A combination of large and small cones restricted to low and high frequencies respectively had many advantages over a single unit.

Major Falkis said that for the lowest audio frequencies a large paper cone driven by a large moving coil was still the most satisfactory and for frequencies above 2,000 c/s a moving ribbon construction fitted with a short exponential horn was suitable. The old electrostatic principle, recently revived in Germany, furnished a cheap high frequency component for use between 7,000 and 15,000 c/s, but output was generally insufficient. A French development was the Ionophone, which was without moving parts; in an example demonstrated a radio-frequency glow discharge took place in a 3in quartz tube having one end open to the air to which the horn was attached. The radio frequency was amplitude-modulated with the audio signal and the instantaneous amount of the discharge was varied in sympathy with the audio input. This caused pressure changes in the tube which, when butted against the throat of an exponential horn, was converted into sound waves. The frequency power to the Ionophone was 20 Mc/s. Radio interference could be controlled by normal screening and mains filters. Several other types of loudspeaker were demonstrated in association with a high-quality amplifier of 12 W output and recordings were made on magnetic tape and 33⅓ r.p.m. discs.

BRAZILIAN REGULATIONS REVISED

From Our Rio Correspondent

SWEEPING changes were made, without prior warning, in Brazil's foreign trade regulations on 12th October. All export bills must now be sold to the Bank of Brazil, either directly or through the intermediary of authorized banks; exporters will receive, in addition to the proceeds in cruzeiros at the official rate of 51·408 to £1, a premium of 10 cruzeiros per dollar, or the equivalent in other currencies. The premium for sterling is 27·26 cruzeiros. The measure, it is hoped, will facilitate the sale of high-priced Brazilian products abroad at international parities.

The exchange available for imports will be divided among five categories of merchandise, classified according to the relative importance of each to the national economy. Commencing on 16th October, this exchange is being sold at auction on the Stock Exchanges of the principal cities, the proportion of the total allotted to each Exchange ranging from 30 per cent at Rio and Sao Paulo to 1 per cent at Victoria. Only Government Departments, autonomous Government agencies and the head offices in Brazil of registered commercial firms are eligible to bid.

Reasons for Changes

The object of the new measures is to preserve a rigid trade balance, accelerate payment of Brazil's outstanding commercial debts and relieve importers of the dilatory, tiresome formalities of the Prior Licence Law. The immediate effect will be to raise prices in the home market, although the authorities claim to be optimistic in this respect.

The available exchange, estimated at the equivalent of two million dollars daily in all currencies, will be distributed among the categories of merchandise in the following proportions: Category 1, 50 per cent; 2, 25 per cent; 3, 15 per cent; 4 and 5, 5 per cent each. These percentages and the composition of the categories are liable to alteration as experience dictates.

Category 1 includes turbines and electrical machinery and apparatus for hydraulic power stations; radio transmitting and receiving sets for aircraft; and electromedical and X-ray material, except for dental work and industrial use.

Category 2 includes generators, motors, transformers and the like for thermal power stations; electrical insulating materials, including separators for accumulator plates, but excluding insulators; parts and accessories for machines and apparatus not included in the appropriate category; carbon electrodes, brushes, etc.; tungsten and molybdenum wire.

Category 3 includes parts and accessories for radio and television, except valves and tubes; radar apparatus; telegraph apparatus, parts and accessories; valves and tubes for electrical apparatus; industrial X-ray apparatus; electric starting and ignition equipment for i.c. engines; electric lighting and signalling equipment for motor vehicles, aircraft and ships, except passenger automobiles; portable electro-mechanical tools; apparatus for measuring and regulating current; electric signalling and safety devices; arc lamps for cinemas and unspecified special lamps; insulated tubes, junctions and joint boxes; furnaces, ovens and the like for industrial use; apparatus to control, regulate and distribute current; windmill-driven generators; cranes; industrial fans and exhausters; copper wires and cables.

Category 4 includes telephone apparatus and accessories; dry cells and batteries; miniature lamps for bicycles, hand torches, etc.; automobile lamps; and insulators for over 220 kV.

(Categories 3 and 4 include the bulk of the industrial machinery, office appliances and scientific apparatus that may be imported, much of which may be electrically operated).

Category 5 includes all articles not specifically mentioned in other categories, such as assembled automobiles, luxury articles and non-essential merchandise.

Ideal Home Exhibition

The 1954 Ideal Home Exhibition will be held at Olympia, London, from 2nd to 27th March.

Westminster College Extensions

A FIVE-STOREY extension opened at the Westminster Technical College, Vincent Square, S.W.1, includes an enlargement of the public restaurant, a private dining room, a new library, chemical laboratory, classrooms, a refectory, etc. In the chemical laboratory low voltage supplies of both a.c. and d.c. from a Legg 25 V 40 A transformer and rectifier unit with " Variac " control has been taken to each bench, " Slydlok " fuses being provided. Other electrical equipment in the laboratory consists of a Griffin & Tatlock oven (600 W) and a W. Edwards vacuum plant for precipitation filtration. Fume cupboards are provided in each corner.

Attractive pendant lighting fittings (A. C. Adamson) with wall brackets to match have been installed in the restaurant, private dining room and entrance hall, while fluorescent units (Queensbury Engineering) have been adopted in the drawing offices. Other modern lighting fittings installed in the other rooms have been supplied by Troughton & Young, Ltd., and Hume, Atkins & Co., Ltd. Smiths " Sectric " synchronous electric clocks have been fitted throughout the building.

During the reconstruction the opportunity was taken to modernize the kitchen equipment, the principal innovation being the provision of two large oven ranges (G.E.C.). These are each 4ft wide and comprise eight ovens and a bain marie. They differ in length, however, one being 19ft long and incorporating ten banks of four hotplates, and the other 21ft long with twelve banks of four hotplates. The switchboards for these ranges and also the main switchboard for the new building were supplied by Westwood Switchgear, Ltd. The electrical contractors for the extensions and alterations were Electrical Installations, Ltd. Johnson & Phillips cable was used.

National Poultry Show

THE B.B.C. cookery expert, Miss Marguerite Patten, assisted by demonstrators from three of the leading manufacturers, will be at the Electrical Development Association's section of the " Chicken in the Kitchen " feature of the National Poultry Show at Olympia from 10th to 12th December. At intervals during each day they will be giving demonstrations illustrating new and unusual ways of preparing meals incorporating eggs and poultry, while they will also explain the use of the refrigerator, in particular the value of the deep freeze feature.

After each demonstration the audience will be admitted to both kitchens and given an opportunity of discussing the recipes and inspecting the appliances used as well as those on display, which will include a full range of cookers, refrigerators, food mixers, water heaters and a drying cabinet.

In addition, E.D.A. will also occupy stand 14a, where the theme will be " Electricity for Pigs and Poultry." An electrically operated hammer mill, a farm food boiler for dealing with potatoes and swill, together with a food mixer, will stress the time- and labour-saving qualities of these appliances for holdings of either pigs or poultry. Infra-red heaters, both of the bright and dull emitter types, will be shown, display material explaining their value in rearing chicks and piglets, while equipment for extended electric lighting for increasing winter egg production will also be exhibited. Other electrical appliances of particular interest to the poultry keeper will be incubators and brooders. For the convenience of visitors to the Show a " guide " will be included on the E.D.A. stand giving the names and stand numbers of other exhibitors of electrical equipment.

Train Controlled Announcements

THE General Electric Co., Ltd., has been awarded a contract for the installation of a new automatic announcement system at Stratford Station on the Eastern Region line from Liverpool Street to the Eastern Counties, whereby train announcements are automatically initiated by the trains themselves. The system incorporates features which have not hitherto been used on British Railways.

The various types of announcements are preselected by the signal box staff and as the train approaches the station it operates the track circuit connected with the signalling system, which in turn switches on a special form of tape reproducer connected to the station loudspeaker system. The loudspeakers then start announcing: " The train approaching number — platform will call at——." As the train draws up at the platform a further signal switches the tape reproducer over to a second series of announcements: " The train standing at number — platform will call at——."

The new system, which is being supplied to the requirements of the British Transport Commission, Eastern Region, is suitable for use with both steam and electric services. The particular set of announcements appropriate to a given train does not come into operation until the train operates the track circuits.

A feature of the equipment which has been developed by the G.E.C. is a 3in wide tape for use with a reproducing head which is automatically positioned to the required track. This tape carries the various recorded announcements in up to 25 parallel tracks. Two complete reproducers are being supplied, one for the down electric line and one for the down main line. As soon as the signalling system switches on the automatic announcement equipment the play-back head is moved to the correct preselected track.

Electronic Voltage Control

System Employed at National Physical Laboratory

In certain installations incorporating mercury arc and selenium rectifier equipments it has been found necessary to provide a more precise form of control of the rectified output voltage against varying conditions of load than that hitherto obtainable with the usual types of voltage relays operating in conjunction with motor driven induction regulators.

Such a requirement arose when the Hackbridge & Hewittic Electric Co., Ltd., had to install mercury arc rectifying equipment in the main substation of the National Physical Laboratory at Teddington, on behalf of the Ministry of Works. This supplies d.c. to the various laboratories of the establishment engaged on work of a very precise nature, which calls for stable supply voltages.

Investigation showed that the normal type of electro-mechanical relay exhibited poor response to voltage variations occurring at the output busbars, and measurements taken with several relays revealed that their accuracy was never better than $\pm$ 1 per cent at the operating voltage.

Operational data obtained from the equipment taken from recording voltmeter charts and oscillographic measurements showed that an accuracy of $\pm$ 0·5 per cent was necessary, while the response to voltage variations was required to be as fast as possible, without introducing "hunting" in the regulator system.

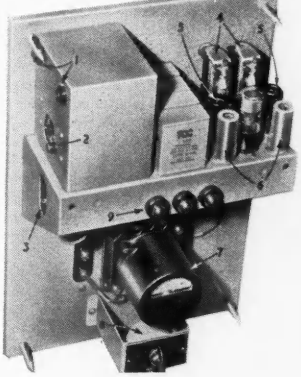
A survey of possible methods of achieving the performance required resulted in the design of an electronic circuit which would fulfil these requirements. The problem of obtaining quick response was solved by incorporating a Sangamo Weston miniature moving coil relay. This S54 relay is used in this application as a differential voltage relay, being fitted with one moving and two fixed precious metal contacts of small dimensions.

When the output busbar voltage, across which the coil of the relay is connected, is at the correct value, the moving contact takes up a central position. If a change of voltage occurs, the moving contact closes with one or the other of the fixed contacts, according to whether the voltage has increased or decreased.

The clearances between the fixed and moving contacts are very small and this, coupled with the high torque of the moving system, results in a quick acting arrangement. By using this voltage relay to control two miniature thyratrons the contacts carry only a minute current of the order of milliamps, the circuit being completely non-inductive.

As is well known, a thyratron can be made to carry zero or a predetermined amount of current by applying suitable voltages to the electrodes. If a positive voltage above a certain critical value is applied to the control electrode, the valve conducts a current which is determined by the parameters of the circuit to which it is connected. Conversely, by applying sufficient negative voltage to this electrode, the valve will carry zero current. Thus it can be made to operate as a high speed electronic "on/off" switch having no inertia.

The electronic voltage controller with cover removed to show (1) main fuses, (2) mains voltage selector, (3) thyratron filament "pre-heat" switch, (4) induction regulator motor control relays, (5) thyratrons, (6) spare thyratrons, (7) S54 voltage relay, (8) "set beam volts" control (9) indicator lights



In the circuit used the two fixed contacts of the relay carry a negative voltage and are connected one to each of the control electrodes of the valves, while the moving contact is connected to a source of positive voltage. When a change of voltage occurs at the output busbars, the moving contact closes with one or other of the fixed ones. This applies a positive voltage to the appropriate valve of such a value that it overcomes the negative potential, thus causing the valve to conduct.

A further relay in the anode circuit of the valve is operated by this current, and in so doing closes a pair of contacts. This causes the motor incorporated in the induction regulator to operate, thereby adjusting the output which supplies the main transformer to that value necessary to bring the busbar back to its original voltage.

When this voltage has assumed the correct value, the moving contact returns to its normal central position. In this process the positive voltage of the moving contact is removed from the control electrode of the valve which has operated, and it is held non-conducting by the negative voltage.

The equipment also incorporates a "set beam volts" control for adjusting the operating voltage at which the unit is to work. The adjustment covers about 5 per cent either side of the selected busbar voltage, thus enabling allowances to be made for volt drop in conductors which may be of appreciable length between the rectifier equipment and the point being supplied.

Another feature is the incorporation of two spare valves in the unit, together with a "pre-heat" switch, enabling them to be run on filaments only. This is desirable since in the event of a valve failure, the replacement one needs to be run for about 30 min after having been in storage to vaporize any mercury which may have been deposited on the electrodes. Failure to do this before putting a valve into service can result in internal flashing-over between electrodes thus rendering it useless.

Three coloured indicator lights are fitted to the unit. The red one shows that the unit is "on" while the other two indicate when it is operating to raise (orange) or lower (green) the supply to the main transformer.

The equipment unit operates from a.c. mains, the input being adjustable to suit voltages between 200 and 250 at a frequency of 50 to 60 c/s. The power consumption of the unit is 27·5 watts.

New Alloy Steel

ONE of the aims of research metallurgists for some time has been to produce an alloy steel which has high strength and at the same time is readily weldable. The United Steel Companies, Ltd., Research and Development Department, has examined many experimental steels only to find that additions of the more commonly used alloys produced steels which were generally difficult to weld although possessing satisfactory mechanical properties.

Another problem, which did not seem to have any connection with strong weldable steel, was also studied. In an endeavour to improve the steel used in power station steam pipes experiments were made to determine the effects of a relatively little used element—boron (which forms one of the main constituents of borax)—on the properties of low carbon molybdenum steel. Mr. W. E. Bardgett, research manager, discovered that when molybdenum and boron were present in certain proportions, the yield point of a low carbon steel was doubled without any necessity for heat treatment. As little as an ounce of boron, when added to a ton of steel containing 0·40 per cent of molybdenum, was sufficient to produce this pronounced and important improvement in strength.

This new steel—"Fortiweld"—has a tensile strength of 40 tons/sq in combined with ease of welding, the latter property being attributable to its low carbon content. In addition to its high strength at ordinary temperatures and easy weldability, "Fortiweld" possesses good properties at 450–500 deg F, and it is capable of withstanding service stresses two to three times greater than those permissible for mild steel.

The unique combination of properties makes the new steel particularly attractive for highly stressed welded structures either at ordinary or elevated temperatures, and many important applications have already been made, including the casings of aircraft jet engines, special tubing and bridge components.

ELECTRICITY SUPPLY

Recent B.E.A. Contracts

Generation Costs in the Isle of Man

CONTRACTS have been placed by the British Electricity Authority during the past month for power stations, transforming stations, and transmission lines amounting in the aggregate to £8,860,590. The principal contracts include the following:—

Brunswick Wharf power station, Poplar: 132 kV 2,500 MVA switchgear.—British Thomson-Houston Co.

Portishead "B" station, nr. Bristol: Structural steelwork for turbine house and annexe, bunker bay and boiler house.—Sir William Arrol & Co. Main and auxiliary power cables, control cables, accessories and station earthing system.—W. T. Glover & Co.

Goldington station, Bedford: Superstructures.—Mitchell Construction Co. One 30 MW turbo-alternator.—British Thomson-Houston Co. Condensing and feed heating plants for one turbo-alternator set.—G. & J. Weir.

Hams Hall "C" station, Birmingham: 132 kV 3,500 MVA switchgear.—A. Reyrolle & Co.

Ocker Hill station, Tipton, Staffs: Three 180,000 lb/hr boilers.—Babcock & Wilcox. Demolition and initial site works.—M. A. Boswell (Contractors), Ltd.

Stourport station: 66 kV switchgear and accessories.—English Electric Co.

Connah's Quay station, nr. Flint: Two 36 MVA generator transformers.—C. A. Parsons & Co.

Ince station, nr. Ellesmere Port: 11·8 kV and lower voltage cables and connections.—British Insulated Callender's Construction Co.

Ferrybridge "B" station, Yorks.: Two 760,000 lb/hr boilers.—Stirling Boiler Co., Ltd. Coal handling plant.—Mitchell Engineering. One 120 MVA generator transformer.—C. A. Parsons & Co.

Marchwood substation, nr. Southampton: Site and foundation works.—Jno. Croad, Ltd.

Dudley substation, Worcs.: 132 kV 2,500 MVA switchgear.—General Electric Co., Ltd.

Monk Fryston substation, Yorks.: 275 kV 7,500 MVA switchgear.—British Thomson-Houston Co.

Penwortham substation, nr. Preston: 132 kV overhead lines.—British Insulated Callender's Construction Co.

Parlour Heating

In 1950 a report was submitted to the Southgate Housing Committee on the heating system in the parlours of about 400 houses on its northern estate. It was stated that the gas fires installed were of an obsolete design, costly to run, while the flue arrangements were unsatisfactory. Consequently many of the tenants rarely used their parlours. At the time it was felt that the matter would have to be left until a scheme for renewing the living room ranges was well in hand, but the Committee is now of the opinion that the replacement of the gas fires cannot be further delayed. It proposes to remove the fires and install electric power points, leaving it to the tenants to buy heating appliances of their own choice. The Eastern Electricity Board proposes to bring in an underground service to each house (in place of the present wiring under the eaves) at no charge to the Council provided that it will bear the cost of the internal modifications necessitated by the new intake, and permanent reinstatement works on Council property. The Committee recommends approval in principle to the carrying out of the scheme which is estimated to cost about £12,000.

Proposed Manx Inquiry

The Lieutenant Governor of the Isle of Man has been asked by the Tynwald to appoint a commission of inquiry to investigate the island's electricity supply. Mr. Cowin said it had been carefully drafted and the question of distribution was purposely omitted, but if the experts advised it he hoped they would have one competent authority; he did not mind which it was.

Mr. J. R. Corrin, chairman of the I.O.M. Electricity Board, who opposed the resolution, said the Board was paying its way and was providing electricity at a reasonable price so that there was no need for a commission of inquiry as far as it was concerned.

The Speaker (Mr. J. D. Qualtrough) said that the cost of generation by the Board was 1·07d and by the Douglas Corporation 1·86d per kWh. If the Corporation's Pulrose station was closed down and a supply obtained from the Board, Douglas would receive electricity at a substantially lower cost. He said that the Board had accepted while the Corporation had rejected the Nimmo Report which proposed that there should be one authority for generating and distributing electricity in the island.

Scottish Schemes

The North of Scotland Hydro-Electric Board last week published Constructional Scheme No. 72 which provides for the erection of transmission lines to connect the power stations

of the Board's Loch Shin Scheme in Sutherland and for an extension of the Highland grid from the future Shin power station near the mouth of the River Shin to Mybster, near Halkirk in Caithness.

Constructional Scheme No. 23B, also published, amends the Moriston Scheme by substituting a diversion of the main trunk road (A87) between Tomdoun and Cluanie Inn for the original road bridge across Loch Loyne.

Lower Church Tariff?

At a meeting of the Yorkshire Electricity Consultative Council in Leeds on 18th November, consideration was given to the Board's standard commercial tariffs. After discussing the report of the Tariffs Sub-Committee the Council accepted the tariffs with the exception of the part relating to places of worship. It was felt that, in general, these premises had a large floor area with a low intensity of lighting which was mainly used at off-peak periods, and that therefore there should be some alleviation. This, however, should not extend to the ancillary premises such as Sunday schools, classrooms, vestries and institutes. The Council decided to ask the Board to apply the following four-block sliding scale to places of worship:—First 8 kWh per quarter for each 100 sq ft of floor area at 4½d, next 16 at 1¾d, next 126 at ⅞d and all in excess at ¾d.

The Council requested the Board to review the tariffs as soon as practicable after the new rates had been in operation for twelve months. It also asked that consideration should be given to raising the basis of the coal clause from 38s to some figure nearer to the actual cost of coal at the present time, to make the coal clause more realistic, and to have in mind a periodical review of the fuel clause increment.

Connah's Quay

The first 30 MW set at the new Connah's Quay power station (B.E.A. Merseyside and North Wales Division) is expected to come into operation this month. The ultimate capacity of the station is 180 MW.

Power for Copper Mines

A statement by Mr. R. L. Prain, chairman of Roan Antelope Copper Mines, Ltd., issued in advance of the company's annual meeting in Lusaka, N. Rhodesia, on 17th December, contains a survey of the company's power position. Mr. Prain says that an agreement has been made with the Union Minière du Haut-Katanga, Belgian Congo, for a supply of up to 500 million kWh annually in 1957–66. The copper belt's power supplies have been co-ordinated by the Northern Rhodesia Power Corporation in which the company had a 25 per cent interest. Last July the Corporation transferred its assets to a new company, the Rhodesia Congo Border Power Corporation, Ltd., the company retaining 25 per cent of the shares with three others having similar holdings. Around the end of the current decade power should be available from the Kafue River hydro-electric development, financing arrangements for which are well advanced.

Further Irish Projects

The Irish Electricity Supply Board is to undertake a new hydro-electric project on the river Clady in County Donegal to produce an annual output of 13,500,000 kWh from a 4,000 kW installation. The Board has invited tenders for the civil construction work. A hand-won peat-fired electricity generating station for the Gweedore district is also being planned. It is one of four small stations to be built, the others being in Kerry, Clare and Galway.

LIGHTING NOTES

THE Minister of Transport has authorized the provision of new electric lighting columns in Honor Oak Park, LEWISHAM, between Stondon Park and Forest Hill Road, at an estimated cost of £2,565, and in Southend Lane between Fambridge Road and Bell Green Lane (£1,777).

BERMONDSEY Borough Council proposes to provide more efficient lighting for routes A100 and A200 (Tower Bridge Road, Duke Street Hill, Tooley Street, Dockhead, Parkers Row, Jamaica Road and Lower Road). The cost is estimated at £16,233.

FINCHLEY Highways Committee has authorized the borough engineer and surveyor to carry out sodium lighting improvements at a cost of £3,160 in Woodhouse Road, Granville Road and Nether Street.

ALNWICK U.D.C. is seeking loan sanction for £1,950 for the lighting of trunk roads.

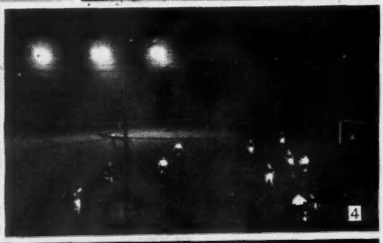
BROADSTAIRS AND ST. PETER'S U.D.C. has approved schemes estimated to cost £3,718 for Class "A" lighting in parts of Margate Road and Ramsgate Road.

DARLINGTON Town Council has submitted to the Ministry of Transport a £4,500 scheme for improving the electric street lighting in Coniscliffe Road. It is also proposed to spend £2,600 on other lighting improvements.

A scheme is to be prepared for installing mercury fluorescent lighting on the trunk road at FELLING (Co. Durham).

SPENBOROUGH (Yorks) U.D.C. is recommended to approve a scheme estimated to cost £13,220 for sodium street lighting from the Bradford boundary to the Heckmondwike boundary.

PORTSMOUTH Roads, Works and Drainage Committee has approved a scheme submitted by the city engineer for improved lighting in Stubbington Avenue at a cost of £2,000. The existing tungsten lamps are to be replaced by mercury electric discharge lamps.



FLOODLIT FOOTBALL

THE majority of the large football clubs have now had floodlighting equipment installed on their football grounds to enable games to be played after dark. We have received a number of photographs from various companies illustrating installations carried out with their equipment, and some of these are shown in the accompanying pictures.

(1) Bury Town F.C. ground floodlit by equipment supplied by the Revo Electric Co., Ltd. (2) Holophane fittings at the Molineaux ground of Wolverhampton Wanderers (installation by France's Electric, Ltd.). (3) Brockville Park, Falkirk, using Simplex "Reflecto-Flood" floodlights (installation by James Scott & Co.). (4) The new B.T.H. system at Watford which enables fittings to be mounted at a low level (installation by Childs, Ltd.). (5) G.E.C. fittings installed on the ground of Millwall F.C. (contractors, Page & Girling, Ltd.). (6) Floodlighting on the ground of the Gravesend–Northfleet Club with equipment supplied by Thorn Electrical Industries, Ltd. (installed by the South Eastern Electricity Board)

Financial Section

STOCKS and SHARES

BUSINESS in the Stock Exchange remains fairly active, but is at present of a more two-way character than was the case during the early autumn. The buyers have lost, at least temporarily, the ascendancy established at that season. Industrial share prices continue, nevertheless, to be firm. They have had the assistance of a slightly harder tendency in the gilt-edged market, and of more company news items of the favourable kind published recently by Lucas, S. Smith, B.S.A. and others. The new United Steel Companies shares (the first in the de-nationalization list) continue to be quoted slightly below their issue price of 25s. The next steel share operation is not now expected until the New Year.

Lucas Dividends

Joseph Lucas £1 shares have been well maintained at about their best price of the year since news of the modest increase in the dividend, followed last week by publication of the full report. An interesting item in the latter is the disclosure of the board's intention to make no interim dividend payment in the coming year. With the motor trade back now on a seasonal basis, the chairman explains, the outcome of a full year's trading becomes difficult to foresee at the interim stage. The dividend, which could otherwise have been declared then, is to be included in the distribution after the end of the year.

Assets and Earnings

Full accounts of Joseph Lucas (Industries) show the latest annual dividend rate, $10\frac{5}{6}$ per cent, to be covered more than five times over by the surplus available for distribution and reserves. In the balance sheet, free reserves amount now to nearly £14½ million, in support of issued capital (including preference stocks) of £7·1 million. Current assets exceed liabilities by £19 million, and total net assets of the group (at book values) can be calculated to represent some 66s per £1 ordinary share. Justice is done to the unusual strength of the position by the quotation of the shares on a yield basis of barely 4½ per cent.

Issue News

London Electric Wire & Smiths are to hold a meeting on 15th December to authorize the distribution of a 100 per cent capital bonus. A statement from the chairman gives the warning, now usual on this occasion, that the operation should not be taken as an indication of the rates of future dividends. At their present price of 75s 9d, the shares show a yield of under 4 per cent on the basis of the conservative 15 per cent paid for last year. Preparations are reported to be in progress for an introduction to the Stock Exchange of ordinary shares in the Electrical Apparatus Co. The marketing is expected to take place about a week before Christmas.

Dewhurst Results

Dealings in Dewhurst & Partner 2s shares were recorded at around 6s 6d after the declaration of the final dividend of 15 per cent for the year ended in September. This again brings the total to 19 per cent, the rate to which it was raised after the two-for-one share bonus of 1951. The profit of £46,000 (after deduction of £95,500 taxation) is close up to last year's good figure, and leaves plenty to spare after the distributions costing under £19,000 net. Allowing for the value of the dividend in the price, the shares stand to yield approximately 6 per cent.

Aerialite Report

Aerialite has issued shares both as a bonus and for cash in the last few years, but the issued ordinary capital of £75,000 still has a very modest appearance in comparison with the sums actually employed in the business. Declared as a rate per cent on the nominal capital, the annual distributions have consequently been for many years at an unusually high figure. For the year ended last May, the total is being brought up, for the third year in succession, to 88½ per cent. Trading profits are reported to have maintained their upward course and, after much larger taxation, the net surplus is also usefully higher at £76,000. This covers the ordinary dividend distribution about twice over. Quoted at a little under 10s x.d. the 1s shares pay 9 per cent on the money.

Shares on Offer

Among the lower-priced shares which have recently been on offer in fairly large numbers, mention may be made of Wolf Electric Tools 5s ordinary at 11s 6d, showing a 6½ per cent yield on the last dividend of 15 per cent; Electrical Components 5s ordinary at 11s 3d, yielding over 8¾ per cent on the 20 per cent dividend; and Watford Electric 2s shares at 5s 3d. The Watford company has distributed a 60 per cent share bonus since the payment of 25 per cent for 1952. If the rate were to be adjusted in strict proportion to the number of shares now ranking, the yield would be a little under 6 per cent.

ELECTRICAL INVESTMENTS

Past Week's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 30th Nov. 1953	Week's Rise or Fall	Est. Yield p.c. £	s	d
Gilt-edged and Overseas Stocks							
Brit. Elec. 1968/73	3	3	90	+½	3	6	8
Brit. Elec. 1974/77	3	3	89	—	3	7	5
Brit. Elec. 1976/79	3½	3½	94	—	3	14	6
Brit. Elec. 1974/79	4½	4½	104	—	4	1	9
Calcutta Elec. ..	6†	6†	19/-	—	6	6	4†
East African Power	7	7	22/-xd	—	6	7	3
Nigerian Elec. ..	10	10	24/6	—	8	3	4
Palestine Elec. "A"	Nil	Nil	19/3	+1/3	Nil		
Perak Hydro-Elec.	Nil	6	15/-	−6d	8	0	0
Equipment and Manufacturing							
Aberdare Cables (5/-)	20	25	8/6	—	7	7	0*
Aerialite (1/-) ..	88½	88½	9/9xd	—	9	1	3
Allen, W. H. ..	15	15	50/-	—	6	0	0
Aron Elec. Ord. ..	15	20	42/6	—	9	8	2
Assoc. Elec. Ord.	20	20	42/6	—	4	14	3*
Automatic Tel. & El.	15	15	62/6	−1/3	4	16	0
Babcock & Wilcox	18	18	47/-	—	—		
Baldwin, H. J. (2/-)	20	20	4/-	—	10	0	0
Bakelite (10/-) ..	—	12½	24/-	—	5	4	3
British Aluminium	12	12	37/-	−6d	6	9	8
B.I. Callender's ..	9	10	39/-	−6d	5	2	6
British Thermostat (5/-)	30	35	18/9	—	—		
British Vac. Cleaner (5/-)	25	25	12/9	—	9	16	0
Brook Motors (10/-)	20	20*	35/-xd	—	5	14	3
Brush Ord. (5/-) ..	10	4	4/3	—	—		
A. F. Bulgin (1/-)	30	30	3/3	—	9	4	6
Burco (5/-) ..	35	35	23/3xd	—	7	10	6
Chloride El. Storage	15	20	43/6	+1/6	4	12	0*
Cole, E. K. (5/-) ..	25	25*	21/3	+9d	5	17	9
Cossor, A. C. (5/-)	10	10	7/-	−3d	7	2	10
Crabtree (10/-) ..	17½	17½	25/-	−1/-	7	0	0
Crompton Parkinson Ord. (5/-) ..	11¼	20	15/-	−6d	6	13	4
De La Rue (5/-) ..	35	Nil	11/3	−9d	—		
Decca (5/-) ..	112½	150	33/6	−6d	4	9	6*
Dewhurst (2/-) ..	19	19	6/6	+3d	5	17	0
DictographTel.(2/-)	20	20*	5/6xd	—	7	5	6
E.M.I. (10/-) ..	12	8	12/9	−3d	6	5	6
Electrical Components (5/-) ..	20	20	11/-	—	9	1	10
Elec. Construction	15	15	53/9	—	5	11	9
Enfield Cable Ord.	7½	5	18/9	—	5	6	8
English Electric ..	15	15	60/-	—	5	0	0
Ericsson Tel. (5/-)	22†	22*†	45/6	−1/-	2	8	4†
Ever Ready (5/-) ..	35	35	28/-	−6d	5	5	0
Falk Stadelmann	15	15	41/3	−1/3	7	5	6
G.E.C. Ord. ..	22½	11¼*	40/-	—	5	12	6
General Cables (5/-)	30	30	16/9	—	8	19	2
Greenwood & Batley	15	17½	40/9	—	8	11	9
Hackbridge Cable (5/-)	20	20	12/9	—	7	17	0
Hackbridge Hewittic (5/-)	20	20	17/6xd	—	5	14	3
Hall Tel. Acc. (10/-)	10	10	12/-	—	8	6	8
Heatrae (2/-) ..	12½	12½	4/-	—	6	5	0
Hedleys (10/-) ..	20	10½*	17/6	—	6	0	0
Hellophane (5/-) ..	20	20	13/-	+6d	7	13	10
Hoover (5/-) ..	35	25	25/3	—	4	19	0

Company	Dividend Previous	Dividend Last	Middle Price 30th Nov. 1953	Week's Rise or Fall	Est. Yield p.c. £	s	d
Equipment and Manufacturing (continued)							
Intl. Combustion (5/-)	25	15*	15/-	—	5	0	0
Johnson & Phillips	15	15	50/-xd	—	6	0	0
Lancashire Dynamo	12½	12½	44/3	—	5	13	0
Laurence, Scott (5/-)	15	15	14/3	—	5	5	3
London Elec. Wire	12½	15	75/9	—	3	19	3
J. Lucas	9½	10⅔	48/9	+1/3	4	8	9
Marryat & S. (2/-)	22½	22½	5/9	—	7	16	6
Mather & Platt ..	12½	15	53/-	−6d	5	13	2
Metal Industries ..	15	12*	38/6	−3d	6	4	8
Mid. Elec. Mfg. ..	15	15	61/3	—	4	18	0
Murex	15	15	52/-	−1/-	5	15	5
Newman Ind. (2/-)	10	10	2/6	—	8	0	0
Oldham & Son (1/-)	35	17½*	2/6	—	7	0	0
Parnall (Yate) (5/-)	6	6	4/1½	+3d	7	5	5
Parsons, C. A. ..	10*	12½	36/3	—	—		
Plessey (5/-) ..	25	30	31/6	+6d	4	15	3
Pye Deferred (5/-)	18	20	21/-	—	4	15	3
Revo (10/-) ..	27½	27½	17/3xd	—	—		
Reyrolle	10*	12½	62/6	—	—		
Scot. Cable (4/-) ..	32	20*	13/-	—	6	3	0
Siemens Ord. ..	10	10	35/-	−1/-	5	14	3
Southern Areas ..	5	6	19/-	+1/-	6	6	4
Strand Elec. (5/-) ..	17½	17½	7/9	—	11	5	6
Sturtevant (5/-) ..	17¼†	18·1*†	29/-	—	—		
Sun Elec.	15	15	25/-	—	12	0	0
Switchgear & Cowans (5/-)	22½	22½	13/9	—	8	3	0
Taylor, T. (5/-) ..	20	25	22/6	—	5	11	0
T.C.C. (10/-) ..	20	20*	42/6	—	—		
T.C. & M. ..	10	8½*	28/6	—	5	19	4
Telephone Mfg. (5/-)	10	10	7/9	—	6	9	0
Thorn Elec. (5/-) ..	10	12½	13/-	—	4	16	2
Tube Investments	15*	15	61/-	—	4	18	3
Vactric (5/-) ..	Nil	Nil	8/9	−1/3	Nil		
Veritys (5/-) ..	7½	10	4/6	—	11	2	2
Walsall Conduits (4/-)	70	70*	45/-	—	6	4	6
Ward & Goldstone (5/-)	45	45*	44/6	—	5	1	2
Watford (2/-) ..	25	25	5/3	—	—		
Westinghouse Brake	14	15	62/-	−6d	4	16	9
West, Allen (5/-) ..	15	15	13/3	—	5	13	2
Trusts, Transport and Communications							
Anglo-Am. Tel.: A. Ord.	—	6	86½	—	6	18	9
Ord.	—	3⅔	57½	—	6	10	5
Anglo-Portuguese	8	8	22/3	—	7	3	9
Brit. Elec. Traction: Def. Ord. (5/-) ..	25	35	36/6	—	4	16	0
Cable & Wireless: Ord.	8	8	144	−2	5	11	1
4% Loan ..	4	4	97	—	4	2	6
Calcutta Trams ..	6†	2½†	18/9	—	—		
Cape Elec. Trams	5½	5½	10/-	—	11	0	0
Marconi Marine ..	10	10	28/9	—	6	19	2
Oriental Tel. Ord.	16	16	72/6	—	—		
Telephone Props.	8	8	5¾	−5/-	—		
Tele. Rentals (5/-)	10	10*	10/-	—	5	0	0

* After capital bonus. † Dividends are paid free of income tax.

The above quotations are based upon the middle prices given in the Stock Exchange Daily Official List.

REPORTS and DIVIDENDS

Burco, Ltd.—The report and accounts now issued show a profit on trading for the year ended 30th September last of £93,991, as compared with £156,448 for the preceding year. After meeting all charges, including £41,983 for taxation, there is a net profit of £62,560 (against £54,281), to which is added £38,495 brought in, making £101,055. General reserve receives £40,000. It is proposed to pay a final dividend of 30 per cent, again making 35 per cent for the year, and to carry forward £38,206.

In his statement which accompanies the report and accounts, Mr. D. K. Ward (chairman and managing director) says that the decrease in profit is attributable to the big fall in the sale of household utensils which began in October, 1952, and continued until the 1953 Budget. Buying during recent months has been on an increasing scale, and production is now at a higher rate than ever in the company's history. Negotiations for the acquisition of Thomas Ashworth & Co., Ltd., Cooper Bros., Ltd., and Taco (Cloche), Ltd., are completed and the contract for the purchase of the whole of their issued capital has been signed. The purchase will be effective on 1st January next. The new acquisitions will absorb Burco's surplus liquid funds and the time is therefore appropriate for a capitalization of part of the reserves. The approval of the Capital Issues Committee has been obtained and it is proposed that ordinary shareholders shall receive one ordinary 5s share for each share held. The new shares will be entitled to dividends declared in respect of the year ending 30th September, 1954. The new issue carries no indication as to the rate of future dividends. It is proposed to increase the authorized capital by 980,000 shares of 5s each to the total nominal value of £350,000. The proposed new issue will use only 420,000 of the new ordinary shares, leaving 560,000 unclassified shares available for future issue. Mr. Ward says that new designs and certain new projects are well under way, and will be in production during the current financial year.

Brook Motors, Ltd.—The main figures in the accounts for the year ended 30th September last were given in our last issue. In his circulated statement, Mr. F. V. Brook (chairman), says that markets were slow to recover from the recession early in the year, and definite improvement was not felt until the last three months of the financial year. Stocks of finished motors in the industrial and fractional horsepower ranges enabled the company to meet the sudden increased demand. There was a similar revival of their direct export trading, although competition from Continental sources is now very keen. To improve direct exports an American company, Brook Motor Corporation, has been formed in Chicago, and the sale of "Brema" motors to American design will be launched in the early part of 1954. Large batches of motors have arrived in the United States. The existing American company, Brook Electrical Motors, Inc., of San Francisco, will be wound up and they will concentrate on sales from Chicago. The new factory at Barnsley has been in use since January last, and the floor area has already been increased. Their range of motors has been increased in both directions, down to $\frac{1}{8}$ h.p. and up to 350 h.p. from the previous limit of 200 h.p. The new research building was brought into use during the year. The company will be celebrating its fiftieth anniversary in May next.

Crabtree Electrical Industries, Ltd., in its accounts for the year ended 31st July last, shows a group net trading profit of £241,076, as compared with £357,244 for 1951-52, which with other income makes £247,519. After meeting all charges the net profit, before taxation, is £188,351, and after deducting £122,750 for taxation, there is a balance of £65,601 (against £113,065), to which is added taxation over-provided in previous years of £8,002, a sum of £9,000 transferred from taxation adjustment reserve, and £178,588 brought in, making £261,191 available. The ordinary dividend for the year is maintained at 17½ per cent by a final payment of 10 per cent, general reserve receives £15,000, and the balance carried forward is £180,160.

Aerialite, Ltd., reports a group trading profit of £230,000 for the year to 31st May last, as compared with £198,115 for the preceding year. After deducting £24,078 for depreciation, £18,349 for directors' fees, and £110,627 for taxation, there is a net profit of £75,886 (against £68,211). It is proposed to pay a final dividend of 55 per cent, again making 88½ per cent for the year. The balance carried forward is £162,457 (£130,695 brought in).

The General Cable Manufacturing Co., Ltd., shows a net profit for the year ended 30th September last of £106,538, as compared with £133,174 for the previous year. From this is deducted taxation of £61,460. The dividend for the year is 30 per cent.

The Electrical Apparatus Co., Ltd.—Arrangements are in hand for putting the company's ordinary shares on the market. To put the equity into market shape, an extraordinary meeting is being held on 17th December to adopt new articles, sanction a one-for-five scrip issue, and split the £ ordinary into shares of 5s denomination.

Hick **Hargreaves & Co., Ltd.**, propose to capitalize £168,000 from reserves for a scrip issue of one new £1 share for every two held. Consent of the Capital Issues Committee has been obtained. An interim dividend of 5 per cent (same) has been declared on increased capital.

The Telephone & General Trust, Ltd.—Particulars were published on Monday last of an issue of £800,000 4½ per cent first debenture stock, 1978-83. The proceeds of the issue will be used for working capital.

The Oriental Telephone Co., Ltd., has declared an interim dividend of 4 per cent (unchanged).

The Lisbon Electric Tramways, Ltd., is paying an interim dividend of 2½ per cent, tax free (same).

Johnson Matthey & Co., Ltd., are paying an interim dividend of 3 per cent (unchanged).

New Companies

Sellers Electronics, Ltd.—Registered 7th November. Capital £2,000. Manufacturers and repairers of and dealers in electronic and other devices, instruments and apparatus for defining the relative specific absolute or percentage of moisture content in air and any other gas, electronic discharge vessels and tubes, etc. R. F. Sellers signs as director. Regd. office : Engine Bridge Mills, Chapel Hill, Huddersfield.

Kencross Radio, Ltd.—Registered 29th October. Capital £1,000. To acquire the business of an electronic engineer now carried on by James T. Wright as Kencross Radio at 191, Kennington Lane, S.E.11. J. T. Wright is first director and chairman. Regd. office : 191, Kennington Lane, S.E.11.

Amos (Electronics), Ltd.—Registered 30th October. Capital £100. Manufacturers of and dealers in electrical, electronic and scientific instruments and component parts, etc. Directors : A. P. G. Amos and Dorothy C. Amos. Regd. office : Ty Gwyn, Mentone Avenue, Aspley Guise, Bletchley.

Chelston Electrical Works, Ltd.—Registered 11th November. Capital £1,000. To acquire the stock, plant, leasehold premises, etc., of the business of electrical engineers carried on by Henry Phere and Frederick A. Staines at Barttelot Buildings, Old Mill Road, Torquay. Directors : F. A. Staines and Mrs. Mabel R. Staines. Secretary : F. A. Staines. Regd. office : Barttelot Buildings, Old Mill Road, Torquay.

Liquidation

Fier Electrical (Brighton), Ltd.—In voluntary liquidation. Meeting of creditors and contributories on 29th December at the offices of A. E. Orbell & Co., 7, Old Steine, Brighton, to receive an account of the winding-up by the liquidator, Mr. J. S. Bradley-Hole.

Bankruptcies

J. Jevons, 187, Wolverhampton Street, Dudley, Worcs, radio, television and electrical engineer, trading as "R.E.C. Stores."—Public examination 28th January at the Court House, Priory Street, Dudley.

J. Robertson, 68, Arran Road, Catford, London, electrical engineer.—Last day for receiving proofs for dividend 8th December. Trustee, Mr. C. T. Newman, 58-61, York Terrace, Regent's Park, N.W.1, Official Receiver.

A. S. Bennett, lately carrying on business at South View, Webb's Avenue, Stannington, Yorks, electrical contractor, now employed as an electrical engineer.—Last day for receiving proofs for dividend 9th December. Trustee, Mr. J. B. G. Moore, 55, Queen Street, Sheffield, 1.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 25th December:—

ALTOREG. No. 722,916, Class 7. Electric alternators.—Laurence, Scott & Electromotors, Ltd., Gothic Works, Hardy Road, Norwich.

CORMORANT. No. 718,704, Class 9. Scientific, nautical and electrical apparatus and instruments, all included in Class 9; radio apparatus and signalling apparatus; all being sold complete.—Rees Mace Marine, Ltd., 11, Hinde Street, London, W.1.

CHILL CHASER. No. 722,502, Class 9. Electric heating elements for steam irons.—Remploy, Ltd., 25-28, Buckingham Gate, London, S.W.1.

COLOVOX. No. 722,621, Class 9. Electric and electronic apparatus and instruments all included in Class 9; radio, television, telephonic and signalling apparatus and instruments; sound recording, sound reproducing and sound transmitting apparatus and instruments; and parts included in Class 9 of all the aforesaid goods; and gramophone needles, records and phonograph rolls.—G. Kingsley, trading as Dictating Machine Co., 32, Victoria Street, London, S.W.1.

EVORIST. No. 722,796, Class 9. Electrical wiring systems for incorporation in buildings, motor land vehicles, boats, aircraft, machines and for electrical apparatus.—Enfield Equipment Co., Ltd., 133, Moorgate, London, E.C.2.

REGUSTAT. No. 722,813, Class 9. Thermostatically-operated electric switches.—Arcolectric (Switches), Ltd., Central Avenue, West Molesey, Surrey.

CHERNETT. No. 722,852, Class 9. Electrical apparatus and instruments included in Class 9.—G. L. A. Cherrington, Rear of 51, Jenkins Street, Birmingham, 10.

BESTOS. No. 722,995, Class 9. Electric cables and insulated electric wires.—British Insulated Callender's Cables, Ltd., Norfolk Street, London, W.C.2.

TASKMASTER. No. 722,436, Class 11. Lighting installations and parts and fittings thereof included in Class 11.—The Benjamin Electric, Ltd., Brantwood Works, Brantwood Road, Tottenham, London, N.17.

NEXT WEEK'S EVENTS

Organizers of electrical functions are advised to make use of the* Electrical Review *clearing house, Room 231, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

Monday, 7th December

BIRMINGHAM.—James Watt Institute, Great Charles Street, 6 p.m. I.E.E. South Midland Centre. "Radio Aids for Airport Control," by E. J. Dickie.

BRADFORD.—Technical College, 7.15 p.m. Bradford Engineering Society. "The Heat Pump," by A. L. Ruckley.

BRISTOL.—S.W.E.B., Colston Avenue, 6 p.m. I.E.E. Western Supply Group. "Safety Precautions in Electricity Supply from the Points of View of Manufacturer, Supply Authority and Factory Department," by E. St. J. Sutton, R. N. Buttrey and B. L. Williams.

GLASGOW.—39, Elmbank Crescent, 7.30 p.m. Royal Statistical Society, Glasgow Group. "Statistics in Operating and Planning Telephone Exchanges," by J. Lothian and M. Harrison.

ILFORD.—Angel Hotel, 8 p.m. A.S.E.E. North-East London Branch. Informal discussion on the 12th edition of the I.E.E. Regulations.

LEEDS.—Great Northern Hotel, 7.30 p.m. A.S.E.E. Leeds Branch. "Miniature Circuit Breakers," by N. W. Woof.

LIVERPOOL.—Arts Theatre, Liverpool University, 6.30 p.m. I.E.E. Mersey and North Wales Centre. "Research in the Electrical Manufacturing Industry," by L. J. Davies.

LONDON.—Savoy Place, 5.30 p.m. Institution of Electrical Engineers. Informal meeting. Discussion on the Ridley Report, opened by C. T. Melling.

MAIDSTONE.—"Wig and Gown," 7.30 p.m. Institution of Electrical Engineers. District meeting. "Electronics in Industry," by B. Kellet and E. R. Davies.

NEWCASTLE-UPON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. "The Electricity Division of the National Physical Laboratory," by R. S. J. Spilsbury.

Royal Turk's Head Hotel. North East Electrical Club. "Short Circuit Testing," by A. Blakey.

NORWICH.—Royal Hotel, 7.30 p.m. Institution of Electrical Engineers. District meeting. "The Basic Principles of Electronic Digital Computing Machines and their Uses," by R. L. Grimsdale.

Monday, 7th, to Friday, 11th December

LONDON.—Earls Court. Smithfield Show and Agricultural Machinery Exhibition.

Tuesday, 8th December

BELFAST.—Presbyterian Hostel, Howard Street, 6.15 p.m. I.E.E. Northern Ireland Centre. "The Royal Festival Hall: Electrical Installation," by J. G. Hunter.

CHELMSFORD.—Public Library, 7 p.m. I.E.E. London Students' Section. District meeting. "Electrical Contacts," by E. M. Briscoe.

KENTON.—Rest Hotel, Kenton Lane, 8.15 p.m. A.S.E.E. North West London Branch. "Mercury Arc Rectifiers," by K. B. Blake.

LEEDS.—The University, 6.30 p.m. I.E.E. North Midland Centre. "Some Applications of Electronics," by Dr. T. G. Bridgwood.

LONDON.—Savoy Place, 5.30 p.m. I.E.E. Measurements Section. "The Determination of Optimum Process Controller Settings and their Confirmation by means of an Electronic Simulator," by R. L. Ford, "The Effects of the Addition of some Non-linear Elements on the Transient Performance of a Simple R.P.C. System Possessing Amplifier Saturation," by Dr. J. C. West, J. L. Douce and R. Naylor, and "The Step Function Response of a R.P.C. Servo Mechanism Possessing Torque Limitation," by Dr. J. C. West and I. R. Dalton.

London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6 p.m. Illuminating Engineering Society. "Lighting for Textile Production," by H. Hewitt.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Supply Group. "The Testing and Specification of Bushings in Relation to Service Conditions," by H. Barker and H. Davies.

NEWPORT.—Tredegar Arms Hotel, 7 p.m. Newport and District Electric Club. "Latest Developments in Electro-Horticulture," by A. W. Gray.

RUGBY.—College of Technology and Arts, 6.30 p.m. I.E.E. Rugby Students' Section. "An Outline of Television Systems," by Dr. R. L. Smith-Rose.

STOKE-ON-TRENT.—31, Kingsway, 6 p.m. I.E.S. Stoke-on-Trent Group. "Neon Lighting," by C. Higgins.

Wednesday, 9th December

BIRMINGHAM.—James Watt Institute, 6.45 p.m. I.E.E. South Midland Students' Section. "Electricity in Industry," by H. J. Gibson (with film).

FARNBOROUGH.—R.A.E. Technical College, 7.30 p.m. I.E.E. Southern Centre. "Colour Perception and Colour Television," by Dr. J. H. Mole.

LONDON.—Savoy Place, 6 p.m. I.E.E. Education Discussion Circle. Discussion on "The Teaching of Electrical Machine Design," opened by Prof. M. G. Say.

London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6.30 p.m. British Institution of Radio Engineers, London Section. "Electronic Aids to Vibration Measurement," by R. K. Vinycomb, "Stroboscopes," by F. M. Savage, and "Vibration Generators," by H. Moore.

MIDDLESBROUGH.—Cleveland Scientific and Technical Institute, Corporation Road, 6.30 p.m. I.E.E. North Eastern Students' Section. Tees-Side meeting. "The Electrical Engineer's Perspective of Heavy Chemical Production," by A. R. Finniecome.

NEWCASTLE-UPON-TYNE.—Neville Hall, Westgate Road, 6 p.m. British Institution of Radio Engineers, North-Eastern Section. "The Effects of Aural Disturbances on Audio Production," by Dr. M. Anderson.

18, Lovaine Place, 7 p.m. Royal Statistical Society, North-Eastern Group. "Electronic Computers," by M. T. Vickers.

YORK.—City Hotel, Lendall, 7.30 p.m. A.S.E.E. York Branch. "Lifts," by B. Pirie.

Thursday, 10th December

BRADFORD.—45–53, Sunbridge Road, 7.30 p.m. I.E.S. Bradford Group. "Cinema Lighting and Regulations."

LEICESTER.—Leicester College, 6.30 p.m. I.E.E. East Midland Centre. "The Industrial Application of X-Rays," by T. E. Tufton, and "Industrial Application of Radio-active Isotopes," by S. Jefferson.

LIVERPOOL.—Electricity Showroom, Whitechapel, 7 p.m. E.P.E.A. Merseyside Technical Group. "Corrosion in Power Stations," by Dr. R. S. Thornhill.

LONDON.—Savoy Place, 5.30 p.m. I.E.E. Utilization Section. "Electric Lifts in Post-War Housing," by C. G. L. Morley.

John Adam Street, W.C.2, 5.15 p.m. Royal Society of Arts, Commonwealth Section. Neil Matheson McWharrie Lecture, "The Development of the St. Lawrence Waterway," by J. F. Grandy.

MANCHESTER.—N.W.E.B., Town Hall Extension, 6 p.m. I.E.S. Manchester Centre. "The Lighting of Churches," by W. T. F. Souter.

SWANSEA.—Central Public Library, Alexandra Road, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. "Economic Aspects of Overhead Equipment for D.C. Railway Electrification," by O. J. Crompton and G. A. Wallace.

Thursday, 10th, to Saturday, 12th December

LONDON.—National Hall, Olympia. National Poultry Show.

(Continued at foot of page 1303)

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 13th January, from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1948

13857. British Thomson-Houston Co., Ltd.—Betatron started synchrotrons. 21st May, 1948. (702193.)

32725. Automatic Electric Laboratories, Inc.—Co-ordinate type electro-selector switch. 17th December, 1948. (702194.)

1949

11650. Naamlooze Vennootschap Philips' Gloeilampenfabrieken, and Threadgold, T. D.—Circuits embodying cathode-ray tubes. 2nd May, 1949. (Addition to 684552.) (Convention date not granted.) (702198.)

19195. Electric & Musical Industries, Ltd.—Non-linear electrical control circuits. 7th July, 1950. (702321.)

1950

641. General Electric Co., Ltd., Hayes, A. G., and Moore, R. C.—Cathode-ray tubes. 9th January, 1951. (702202.)

4590. British Insulated Callender's Cables, Ltd.—Method of applying metal sheaths to electric cables. 21st February, 1951. (702205.)

7106. Electric & Musical Industries, Ltd.—Electrical control circuits. 9th March, 1951. (702325.)

17522. Electric & Musical Industries, Ltd.—Circuits for separating pulses on a width basis. 13th July, 1951. (702138.)

NEXT WEEK'S EVENTS—*Contd.*

Friday, 11th December

ABERDEEN.—Caledonian Hotel, 7.30 p.m. I.E.E. North Scotland Sub-Centre. "Design Features of Certain British Power Stations," by S. D. Whetman and A. E. Powell.

CREWE.—Royal Hotel, 7.30 p.m. A.S.E.E. Stoke and Crewe Branch. "Transformers up to 1,000 kVA."

LONDON.—At the Institution of Electrical Engineers, Savoy Place, W.C.2, 5 p.m. Institution of Post Office Engineers. "Maintenance of T.V. Links," by C. E. E. Clinch and L. Thomas.

At the Royal Society of Arts, John Adam Street, W.C.2, 7.30 p.m. Junior Institution of Engineers. Presidential Address: "Developments and Future Possibilities in Electricity Generation," by Sir John Hacking.

Windsor Castle Hotel, Victoria, S.W.1, 6.15 for 6.45 p.m. Electrical Trades' Commercial Travellers' Association. Dinner-smoking concert.

Rembrandt Hotel, Thurloe Place, Kensington, S.W.7, 7 for 7.30 p.m. Institute of Metal Finishing. Annual London dinner and dance.

NEWCASTLE-UPON-TYNE.—Eldon Grill, Grey Street, 6.30 p.m. I.E.E. North Eastern Students' Section. Section smoking concert.

WEYMOUTH.—Technical College, 6.30 p.m. I.E.E. Southern Centre. "Receiving Aerials for British Television," by I. A. Davidson.

YORK.—Royal Station Hotel 7 p.m. Institution of Civil Engineers, Yorkshire Association. Visit to new signalling installation and paper on "The Principles of Railway Signalling and Modern Trends," by A. F. Wigram.

Saturday, 12th December

DUNDEE.—Royal Hotel, 7 p.m. I.E.E. North Scotland Sub-Centre. "Design Features of Certain British Power Stations," by S. D. Whetman and A. E. Powell.

MANCHESTER.—College of Technology. Manchester Association of Engineers. Conversazione and dance.

23020. Compagnie des Machines Bull.—Record card controlled electric checking apparatus. 19th September, 1950. (702214.)

26279. Board of Trustees of Leland Stanford Junior University.—Transverse electron-discharge travelling-wave tubes. 27th October, 1950. (702145.)

26308. Marconi's Wireless Telegraph Co., Ltd.—Continuously variable high frequency transformers. 28th June, 1951. (702395.)

29487. Telephone Manufacturing Co., Ltd.—Electromagnetic switches. 30th November, 1951. (702218.)

30645. Western Electric Co., Inc.—Electric signal transmission systems and repeaters therefor. 15th December, 1950. (702397.)

1951

957. Standard Telephones & Cables, Ltd.—Telephone system. 12th January, 1951. (702276.)

2554. Poor & Co.—Method of electroplating. 1st February, 1951. (Addition to 599707.) (702220.)

3008. Reyrolle & Co., Ltd., A.—Electric overhead lines. 7th February, 1952. (702334.)

4647. Philips Electrical Industries, Ltd.—Circuits for reducing pulse interference in radio receivers. 26th February, 1951. (702152.)

4686. Eastell, E. L.—Portable battery energized electric lamp equipment. 25th February, 1952. (Addition to 679186.) (702336.)

5908. Metropolitan-Vickers Electrical Co., Ltd.—Electric lanterns. 12th March, 1952. (702400.)

6579. National Research Development Corporation.—Electrical pulse generators. 21st February, 1952. (702401.)

7419. English Electric Co., Ltd.—Steam turbines. 9th May, 1952. (702280.)

10307. Victoria Machine Tool Co., Ltd., Frye, J., and Selby, J.—Electric circuit controlling apparatus particularly for effecting electric cycles of movement of the work tables of machine tools. 30th April, 1952. (702226.)

10641. Macfarlane, J. W., Macfarlane, W. I., and Macfarlane, C. C.—Direct current electricity generators. 8th May, 1952. (702343.)

10871. Lucas (Industries), Ltd., J.—Electric switches for mounting on vehicles' steering wheels. 15th April, 1952. (702284.)

10938. Sunbeam Corporation.—Electric dry shaver. 9th May, 1951. (702227.)

12001. Mullard Radio Valve Co., Ltd.—Television receivers. 9th May, 1952. (702166.)

12806. Electric & Musical Industries, Ltd.—Sound recording or reproducing apparatus. 28th May, 1952. (Addition to 697161.) (702345.)

12809. Electric & Musical Industries, Ltd.—Electric control circuits. 14th May, 1952. (702169.)

13956. Minister of Supply.—Preparation of radioactive isotopes. 11th June, 1952. (702170.)

13996. Lucas (Industries), Ltd., J.—Electric battery lamp. 10th June, 1952. (702407.)

14116. Soc. Radiohm.—Method of manufacturing fixed resistance elements for radio. 14th June, 1951. (702171.)

14538. Metropolitan-Vickers Electrical Co., Ltd.—Processes and apparatus for treating high temperature liquids. 18th June, 1952. (702172.)

15579. Faber, E., and Hahn, L. (trading as Mauz & Pfeiffer).—Vacuum cleaners. 2nd July, 1951. (702287.)

15763. British Thomson-Houston Co., Ltd.—Preparation of chloropolysilanes. 3rd July, 1951. (702349.)

16946. Victor Products (Wallsend), Ltd.—Electric lighting systems also adapted for signalling purposes. 30th June, 1952. (Addition to 632909.) (702230.)

17878. Metropolitan-Vickers Electrical Co., Ltd.—Electrical measuring instruments. 14th July, 1952. (701941.)

18892. Henley's Telegraph Works Co., Ltd., W. T., and Moor, E.—Electrical devices, such as fuse carriers, having blade or leaf contacts. 11th August, 1952. (702233.)

18893. Henley's Telegraph Works Co., Ltd., W. T., and Moor, E.—Cartridge fuse carriers. 11th August, 1952. (702234.)

19504. Electric & Musical Industries, Ltd.—Washing machines. 18th August, 1952. (702291.)

19803. General Electric Co., Ltd., and Barry, J. N.—Apparatus for quantizing electrical signals. 22nd August, 1952. (702351.)

19804. General Electric Co., Ltd., and Barry, J. N.—Television receivers. 22nd August, 1952. (702352.)

20969. Sciaky, D.—Electric sliding contact devices. 5th September, 1951. (701849.)

20989. Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—Television camera tubes. 5th September, 1951. (701827.)

21393. British Insulated Callender's Cables, Ltd.—Joints for electric cables. 10th September, 1952. Addition to 583642. (701828.)

21657. Hazeltine Corporation.—Television apparatus. 14th September, 1951. (701830.)

22433. Lumalampan Aktiebolag.—Fixture for one or more fluorescent electric lamps. 25th September, 1951. (702415.)

22541. National Research Development Corporation.—Electric pulse circuits. 18th September, 1952. (701851.)

22842. Laurence, Scott & Electromotors, Ltd., and Schwarz, K. K.—Remote or automatic control systems for dynamo-electric machines. 30th September, 1952. (701852.)

22855. General Electric Co., Ltd., and Spencer, P. L.—High-frequency electric induction heating apparatus. 23rd September, 1952. (702356.)

23078. Metropolitan-Vickers Electrical Co., Ltd.—Apparatus for generating electrical pulses. 28th August, 1952. (701946.)

24826. Bird Electronic Corporation.—High-frequency electrical transmission lines. 24th October, 1951. (702357.)

25155. Loewe Opta Akt.-Ges.—Tuning control mechanism for broadcast receivers. 26th October, 1951. (702298.)

25304. Telefunken Ges. für Drahtlose Telegraphie.—Radio direction-finding apparatus. 30th October, 1951. (702178.)

27633. Standard Telephones & Cables, Ltd.—Electric rectifiers. 26th November, 1951. (702240.)

28019. Soc. Anon. de Machines Electrostatiques S.A.M.E.S.—Electrostatic generator. 29th November, 1951. (702421.)

29343. Electric & Musical Industries, Ltd.—Non-linear electrical circuits. 9th March, 1951. (Divided out of 702325.) (702359.)

29354. Hazeltine Corporation.—Colour-television system. 14th December, 1951. (702182.)

29488. Radio-Industrie.—Methods for forming thin layers of a substance on curved walls, for instance on the walls of television tubes. 17th December, 1951. (702422.)

29637. Lumalampan Aktiebolag.—Device for supporting a lighting fitting from a ceiling. 18th December, 1951. (702423.)

1952

861. Elektrokemisk Aktieselskap.—Processes for operating electric smelting furnaces. 11th January, 1952. (702303.)

1331. Porzellanfabrik Langenthal Akt.-Ges.—Electric insulators. 16th January, 1952. (702305.)

2055. General Motors Corporation.—Manufacture of high ohmic resistance conductors. 25th January, 1952. (702429.)

2389. Western Electric Co., Inc.—Electric control systems. 29th January, 1952. (702307.)

6321. Hazeltine Corporation.—Electrical switch for selectively connecting coaxial transmission lines. 11th March, 1952. (702363.)

6975. Dubilier, W.—Electrical condensers. 18th March, 1952. (702436.)

7995. Radio Corporation of America.—Wide-band amplifier circuits. 28th March, 1952. (702310.)

8938. Western Electric Co., Inc.—Ceramic-to-metal seals. 8th April, 1952. (702437.)

8994. Pierce Foundation, J. B.—Electrical sockets. 8th April, 1952. (702438.)

10532. Busch-Jaeger Lüdenscheider Metallwerke Akt.-Ges.—Cam-operated electric switches. 25th April, 1952. (702368.)

16242. Philips Electrical Industries, Ltd.—Ignition of gas-filled or vapour-filled discharge tubes. 27th June, 1952. (702371.)

16248. Standard Telephones & Cables, Ltd.—Voice frequency signal receivers. 27th June, 1952. (Addition to 701622.) (702253.)

20148. Standard Telephones & Cables, Ltd.—Gaseous discharge tube counting chains. 11th August, 1952. (Addition to 677872.) (702256.)

22282. Automatic Electric Laboratories, Inc.—Flat-type switch. 17th December, 1948. (Divided out of 702194.) (702258.)

1953

13681. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Circuits embodying cathode-ray tubes. 2nd May, 1949. (Divided out of 702198.) (Addition to 684552.) (702263.)

20606. British Thomson-Houston Co., Ltd.—Betatron-started synchrotrons. 21st May, 1948. (Divided out of 702193.) (702264.)

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CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Alnwick (Northumberland).—12th December. R.D.C. Electrical installations in 22 houses at Longhoughton and seven at Glanton. Reavell & Cahill, architects, Lloyds Bank Chambers.

Ballygally (Co. Antrim).—26th December. Wiring etc., of Presbyterian Church. W. J. F. Donald, church treasurer, Grace Avenue.

Belfast.—14th December. Electrical installation at St. Gabriel's Intermediate School. J. R. W. Murland, consulting engineer, 13, Wellington Place.

1st January. Electricity Department. Telegraphs and operational telephones, and lighting and heating installations in 33 kV switchhouse. (See this issue.) Stores for the year ending 31st March, 1955. (See this issue.)

Belgium. — BRUSSELS. — 4th December. Premier Bureau de la Direction de la Transmission et du Matériel. Insulated cables and wires. (E.S.B. 10174/53. Ten/7624.)*

Carlisle.—15th December. City Council. Electrical installations in 190 houses. City engineer, 18, Fisher Street.

Castle Ward (Northumberland).—23rd December. R.D.C. Electrical installations in 146 houses at Brunswick Village. G. E. Dimmack, surveyor, North Road, Ponteland.

Cockermouth. — 16th December. U.D.C. Street lighting equipment. (See this issue.)

Dagenham.—9th January. Town Council. Cables, conduit and accessories for one year. Borough surveyor, Civic Centre.

Durham.—18th December. County Council. Electrical installations in schools. (See this issue.)

India.—AHMEDABAD.—7th December. Municipal Commissioner, Lighting and Power Plants. Eight electrically-driven pumping sets. (E.S.B. 10173/53. Ten/7614.)*

2nd February. Director General of Industries and Supplies. V.h.f. direction finders, accessories and spares. (E.S.B. 10094/53. Ten/7631.)*

London. — WANDSWORTH. — 1st January. Town Council. Lamps for one year from 1st April. Town clerk, Municipal Buildings, S.W.18.

Pakistan.—KARACHI.—9th December. Director General of Supply and Development. Two oil immersed transformers. (E.S.B. 10065/53. Ten/7615.)* 1,000 kVA power transformer. (E.S.B. 9930/53. Ten/7625.)*

*Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

Romford. — 9th January. Town Council. Lamps for one year. Borough surveyor. Town Hall.

Rowley Regis.—6th January. Corporation. Street lighting equipment. (See this issue.)

Sedgefield (Durham).—R.D.C. Electrical appliances for new houses and bungalows; R. Dobson, housing architect.

South Africa. — JOHANNESBURG. — 7th January. South African Railways. Ten portable metal rectifiers for aircraft engine starting and testing purposes. (E.S.B. 10154/53. Ten/7628.)*

Stamford. — 27th January. Corporation. Street lighting equipment. (See this issue.)

Torpoint.—18th December. U.D.C. Electrical installations in 44 houses and flats, Queens Park Estate. (See this issue.)

Washington (Co. Durham).—14th December. U.D.C. Electrical installations in 50 houses, Oxford Avenue. Surveyor, Council Offices.

ORDERS PLACED

Altrincham. — Corporation. Recommended. Street lighting in Stockport Road (£3,815).—G.E.C.

Bexley.—Corporation. Recommended. Electrical installation work in houses at the Halcot No. 3 estate (£12,206).—Norwood Electrical Co.

Bradford.—Markets and Fairs Committee. Recommended. Renewal of electrical installation at Rawson Place Market (£1,129).—Norris Jowett.

Congleton. — Corporation. Recommended. Electric lighting along a section of the Manchester-Newcastle route (£4,718).—B.T.H. Co.

Liverpool.—Highways and Planning Committee. Recommended. Nine "Electruk" pedestrian controlled street refuse collecting vehicles (£3,861).—T. H. Lewis, Ltd. One "Manulectric" pedestrian controlled street refuse collecting vehicle (£410).—Sidney Hole's Electric Vehicles.

London. — LEWISHAM. — Housing (Building) Committee. Accepted. 300 consumers' semi-flush electricity supply control units (£1,582).—Mantel Metalworkers, Ltd.

Sheffield. — Corporation. Recommended. Electrical installation work at the Beaver Hill Secondary School (£6,987) and Hurlfield Secondary Girls' School (£9,692).—Yorkshire Electricity Board.

Skegness.—U.D.C. Recommended. Electrical work in 34 houses, Sundial Estate (£81 per house).—R. Butler.

Smethwick.—Corporation Housing Committee. Recommended. Electrical work and installing radio aerials and television aerials and amplifiers at dwellings in South Road and Broomfield (£1,450).—Harris & Sheldon.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ampthill.—County primary school; county architect, Shire Hall, Bedford.

Ascot.—Private housing estate; Laurence Weaver, Ltd., builders, 45, Ledgers Road, Slough.

Atherstone.—Three pumping stations and sewage disposal works for R.D.C.; Richards & Dumbleton, consulting engineers, 45, Newhall Street, Birmingham, 3.

Birkenhead. — Showroom and workshop, New Chester Road and Union Street, for Bebington Motors, Ltd.; R. Davies, Son & Escolme, 167, Old Chester Road.

Birmingham. — Day nursery, Frankfurt Street and Summer Lane; city architect.

Bristol.—Further stage of adaptations at Muller's Orphanage for College of Technology (£148,317); Stone & Co., Ltd., builders, Redland Road, Bristol.

Corby.—Three-storey block of shops and maisonnettes, Occupation Road; Gotch, Saunders & Surridge, architects, Bank Chambers, Kettering.

Fire station (£15,150); county architect, Northampton.

Croydon.—Extensions (£166,000), Lanfranc Secondary Boys' School; Riches & Blythin, architects, 16, Northumberland Avenue, W.C.2.

Flats (39), Brigstock Road; borough engineer.

Dagenham.—Flats (108), on site north of Eastern Avenue; town clerk, Civic Centre.

Daventry.—Factory for British Timken, Ltd.; C. E. Fillmore, architect, 20, Waterloo Street, Birmingham.

East Barnet. — Old people's flats (20), Churchmead Close; surveyor, Town Hall, Station Road, New Barnet.

Eastbourne.—Factory and office block on the Brampton Road estate; Hotchkiss, Ltd., Eastbourne.

Flats (20), with restaurant, Hartington Place; F. Troy & Co., Ltd., builders, 129, Great Suffolk Street, S.E.1.

Edmonton. — Works extensions; Shrager Bros, Ltd., Bridport Road, N.18.

Erith.—Flats (30), as first section of Albert Road/Victoria Street scheme, Belvedere; borough surveyor, Town Hall.

Eston.—Houses (32), Redcar Road East estate, for U.D.C.; N. C. Harrison, surveyor, Council Offices, South Bank-on-Tees.

Felling (Co. Durham).—Factory, Abbotsford Road, for Stoneygate Flooring Co.

Finchley.—Central library, Hendon Lane; borough surveyor, 294-296, Regents Park Road, London, N.3.

Framwellgate Moor (Co. Durham).—Ambulance station (£24,646); county architect, Court Lane, Durham City.

Gateshead.—Multi-storeyed flats (196), Barn Close (£482,000); Wimpey & Co., Ltd., builders, Orchard House, Newcastle-on-Tyne.

Gloucester. — Reconstruction of Hatherley Works, Hatherley Road; G. Percy Trentham, Ltd., Wood Lane, Birmingham.

Halifax.—New unit for 50 patients on site of Warley House, for Leeds Regional Hospital Board; W. A. Shee, secretary to the Board, Park Parade, Harrogate.

Harrow.—Extensions to Downer Secondary Grammar School (£22,955) for Middlesex E.C.; county architect, 10, Great George Street, London, S.W.1.

Liverpool. — Clothing factory, Constance Street, for L. & B. Grodner; A. E. Shennan, architect, 17, North John Street, Liverpool.

Llanelly. — Operating theatre and X-ray department at the General Hospital; Welsh Regional Hospital Board, Cathays Park, Cardiff.

London.—BLOOMSBURY.—School of Pharmacy, Brunswick Square; Higgs & Hill, Ltd., builders, Crown Works, South Lambeth Road, S.W.8.

HAMPSTEAD.—Flats (100), Finchley Road; L. de Soissons & Partners, architects, 3, Park Square Mews, W.1.

SHOREDITCH.—Flats (40), Windsor Terrace; borough engineer.

SOUTH LAMBETH.—Bakery and offices; Vauxhall Cake Supply Co., Ltd., 169, Wandsworth Road, S.W.8.

Luton.—Factory and offices, Union Street; South Beds Sheet Metal Works, Ltd., 1, Old Bedford Road.

Manchester.—St. John Bosco R.C. School, Blackley; Greenhalgh & Williams, architects, 10, Mawdley Street, Bolton.

Reconstruction of factory, Piercy Street, Ancoats, for Harvey & Longstaff, Ltd.; Donald McDonald, Ltd., Trafford Bar, Manchester.

Hotel and flats, Platt Fields, Rusholme; A. R. Johnston, architect, 11, Peter Street, Manchester.

Margate.—Factory for Lines Bros., Ltd., Morden Road, S.W.19.

Houses (78), Park Lane, Birchington; and flats (86), with 10 shops, Zion Place area; W. L. Armstrong, borough surveyor, 38, Grosvenor Place.

Middlesbrough.—Children's home at Park End; J. A. Kenyon, borough engineer.

Northumberland.—Child welfare centre at Bedlington (£12,000) and conversion of Doxford Hall, Chathill, into old people's home for the C.C. (£10,000); county architect, County Hall, Newcastle-on-Tyne.

Notts.—Fire stations at Edwinstowe (£9,500), Ruddington (£8,000), Bingham (£9,500) and Kirkby-in-Ashfield (£20,000); county architect.

Pontyclun. — Additional hospital block, Hensol Castle Institution; Ivor Jones & John Bishop, architects, 6, St. John's Square, Cardiff.

Stafford.—Factory for Evode, Ltd.; W. J. Whittall & Son, Ltd., 32, Lancaster Street, Birmingham.

Sunderland. — Proposed public baths on North Moor estate and at Nookside; borough engineer.